469278

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF, ARMY RESERVE
2400 ARMY PENTAGON
WASHINGTON, DC 20310-2400

August 28, 2002

Army Reserve Engineer

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RECEIVED
SEP 02 2002
PRP INV/INFO SECTION

Ms. Carlyn Winter Prisk
(3HS11)
U.S. Environmental Protection Agency
Region III
1650 Arch Street
Philadelphia, PA 19103-2029

Dear Ms. Prisk:

Enclosed please find the Office of Chief, Army Reserves response to the U.S. Environmental Protection Agency's Section 104(e), Comprehensive Environmental Response and Liability Act, request for information regarding the landfills in the Lower Darby Creek Area Superfund Site which operated from 1958 to 1976.

Information obtained from your office indicates that the Army Reserve facility in Bristol, Pennsylvania, used Tri-County Hauling and, perhaps, another company, Magnum, in the summer and fall of 1974 to transport unidentified material to undisclosed locations. (TAB 8) The Army's records retention policy during that time required the Army to destroy contract files three or six years after final payment had been made depending upon the contract's value. Despite that record retention policy, the Army personnel searched a number of active, reserve and national guard facilities for records responsive to this request. Unfortunately, we were unable to locate military records confirming the existence of any contract or arrangement for the disposal or materials at the site between the Army, the companies listed above or any other company. Despite the absence of any contract records from that time frame, Army Reserve personnel believe that the waste transported by Tri-County Hauling and Magnum resulted from construction activities at the Bristol Reserve facility which was built between 1974 and 1975. Construction debris from these activities may have included small quantities of copper and/or lead piping, lead based paint, PCBs from generator switchboards, mercury from thermostats and asbestos containing materials (e.g., floor tiles, roofing shingles, pipe insulation).

We believe all responsive records have been destroyed consistent with the Army's records retention policy; nonetheless, as final quality control measures, we have begun reviewing consolidated index reports from the federal records center at Suitland, Maryland and St. Louis, Missouri and have coordinated with the Corps of Engineers in New York and another reserve command in New Jersey, the 77th Regional Support Command, to determine whether any of those locations has any relevant information. When those document search efforts are complete, we will provide those responses to your office.

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I am sending a copy of this letter, without the enclosure, to Lieutenant Colonel Taylor at the 99th Regional Support Command and Mr. Richard Smith at the U.S. Army Reserve Command.

If you have any questions about this response, please do not hesitate to contact Lieutenant Colonel David Harney, Environmental Law Division, at 703-696-1596 or at harneydp@hqda.army.mil.

Sincerely,

Del Fougner
Colonel, U.S. Army
Army Reserve Engineer

Enclosure

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Office of the Chief, Army Reserve

Response to EPA, Region III

Request for Information

Under § 104, CERCLA,

Lower Darby Creek Area Superfund Site

August 28, 2002

Response to Section 104(e), CERCLA, Questionnaire
Lower Darby Creek Superfund Site

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Table of Contents

1. Letter, EPA Region III, 12 December 2001, subj: Required Submission of Information Lower Darby Creek Area Superfund Site – Clearview Landfill, Folcroft Landfill and Folcroft Annex Landfill.

2. Site Information from http://www.epa.gov/reg3hwmd/super/PA/lower-darby/pad.htm and http://www.atsdr.cdc.gov/gsql/getchems.script?in_site=PASFN0305521.

3. Army Response to Section 104(e), CERCLA Questionnaire.

4. U.S. Army Toxic and Hazardous Materials Agency, "Historical Overview of the Nike Missile System", December 1984.

5. U.S. Army, Corps of Engineers, Huntsville Division, "Final Report, Investigation of Former Nike Missile Sites For Potential Toxic and Hazardous Waste Contamination," March 1986 (2 vols.).

6. Army Regulation (AR) 5-9, *Intraservice Support, Installation Area Coordination*, 17 May 1974, with Appendix B, Map B-1.

7. Materiel Data Safety Sheets.

8. Tri-County Hauling Invoices and other documents provided by EPA, Region III.

9. Management Improvement Program Report for the Third Quarter of 1956 from Fort Dix

10. AR 340-18-14, *Maintenance and Disposition of Logistics Functional Files*, 14 Aug 1969.

11. AR 340-18-15, Maintenance and Disposition of Facilities Functional Files, 14 Aug 1969.

12. AR 345-210, *Records Management File Systems and Standards*, 31 Oct 1962.

13. AR 345-215, *Records Management – TOE Units of the Active Army and the Army Reserve*, 1 Nov 1962.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

DEC 12 2001

U.S. Army Reserve
Office-Chief Army Reserve
DAAR-GO Suite 9200
1421 Jefferson Davis Highway
Arlington, VA 22202-3259

Attention: Lieutenant General Thomas J. Plewes, Chief-Army Reserve

Re: Required Submission of Information
Lower Darby Creek Area Superfund Site - Clearview Landfill, Folcroft Landfill, and Folcroft Landfill Annex

Dear Lieutenant General Plewes:

The U.S. Environmental Protection Agency ("EPA") is seeking information concerning the release, or threat of release, of hazardous substances, pollutants or contaminants into the environment at the Clearview Landfill ("Clearview"), Folcroft Landfill ("Folcroft"), and Folcroft Landfill Annex ("Folcroft Annex") portions of the Lower Darby Creek Area Superfund site, located in Delaware and Philadelphia Counties, Pennsylvania (hereinafter the "Site").

The Site is located in an industrialized portion of southeastern Delaware County and southwestern Philadelphia County, Pennsylvania, along an approximately two-mile stretch of Darby Creek, between Cobbs Creek to the north and the tidal marsh of John Heinz National Wildlife Refuge at Tinicum to the south (see Enclosure A). The Site also includes contaminated portions of areas along Darby Creek downstream as well as a portion of a 3500-acre tidal marsh.

EPA has reason to believe that wastes generated at locations owned or operated by the U.S. Army Reserve, may have been transported to and disposed of at the Site, specifically at Clearview, Folcroft, and Folcroft Annex. Clearview is located on the east side of Darby Creek; Folcroft and Folcroft Annex are located on the west side of the creek.

Pursuant to the authority of Section 104(e) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended ("CERCLA"), 42 U.S.C. Section 9604(e), EPA has the authority to require the U.S. Army Reserve (hereinafter "you"), to furnish all information and documents in your possession, custody or control, or in the possession, custody or

control of any of your employees or agents, which concern, refer, or relate to hazardous substances as defined by Section 101(14) of CERCLA, 42 U.S.C. Section 9601(14), pollutants and/or contaminants as defined by Section 101(33) of CERCLA, 42 U.S.C. Section 9601(33), which were transported to, stored, treated, or disposed of at the above-referenced Site.

Section 104 of CERCLA authorizes EPA to pursue penalties for failure to comply with that section or for failure to respond adequately to required submissions of information. In addition, providing false, fictitious, or fraudulent statements or representations may subject you to criminal penalties under 18 U.S.C. Section 1001. The information you provide may be used by EPA in administrative, civil, or criminal proceedings.

You must respond in writing to this required submission of information within **fifteen (15) calendar days** of your receipt of this letter. For a corporation, the response must be signed by an appropriately authorized corporate official. For all other entities, the response must be signed by an authorized official of that entity.

If, for any reason, you do not provide all information responsive to this letter, then in your answer to EPA you must: (1) describe specifically what was not provided, and (2) provide to EPA an appropriate reason why the information was not provided.

All documents and information should be sent to:

Ms. Carlyn Winter Prisk (3HS11)
U.S. Environmental Protection Agency, Region III
1650 Arch Street
Philadelphia, PA 19103-2029

This required submission of information is not subject to the approval requirements of the Paperwork Reduction Act of 1980, 44 U.S.C. Section 3501 et seq.

If you have any questions concerning this matter, please contact Civil Investigator Carlyn Winter Prisk at (215) 814-2625, or have your attorney contact Brian Nishitani of EPA's Office of Regional Counsel at (215) 814-2675. To discuss the Site in general or the nature of the cleanup, contact Kristine Matzko, the Remedial Project Manager, at (215) 814-5719.

Sincerely,

Larry S. Miller
Chief, PRP Investigation and
Site Information Section

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Enclosures: Enclosure A: Lower Darby Creek Area Site Map
Enclosure B: Business Confidentiality Claims/Disclosure of Your Response to EPA Contractors and Grantees
Enclosure C: List of Contractors that May Review Your Response
Enclosure D: Definitions
Enclosure E: Instructions
Enclosure F: Questions

cc: Mr. Brian Nishitani (3RC44) EPA Region III, Office of Regional Counsel
Ms. Kristine Matzko (3HS21) EPA Region III, Remedial Project Manager
Mr. William Arguto (3ES30) EPA Region III, Environmental Services
Mr. Craig Olewiler, Pennsylvania Department of Environmental Protection
Ms. April Flipse, Pennsylvania Department of Environmental Protection

Enclosure A

Lower Darby Creek Area Site Map

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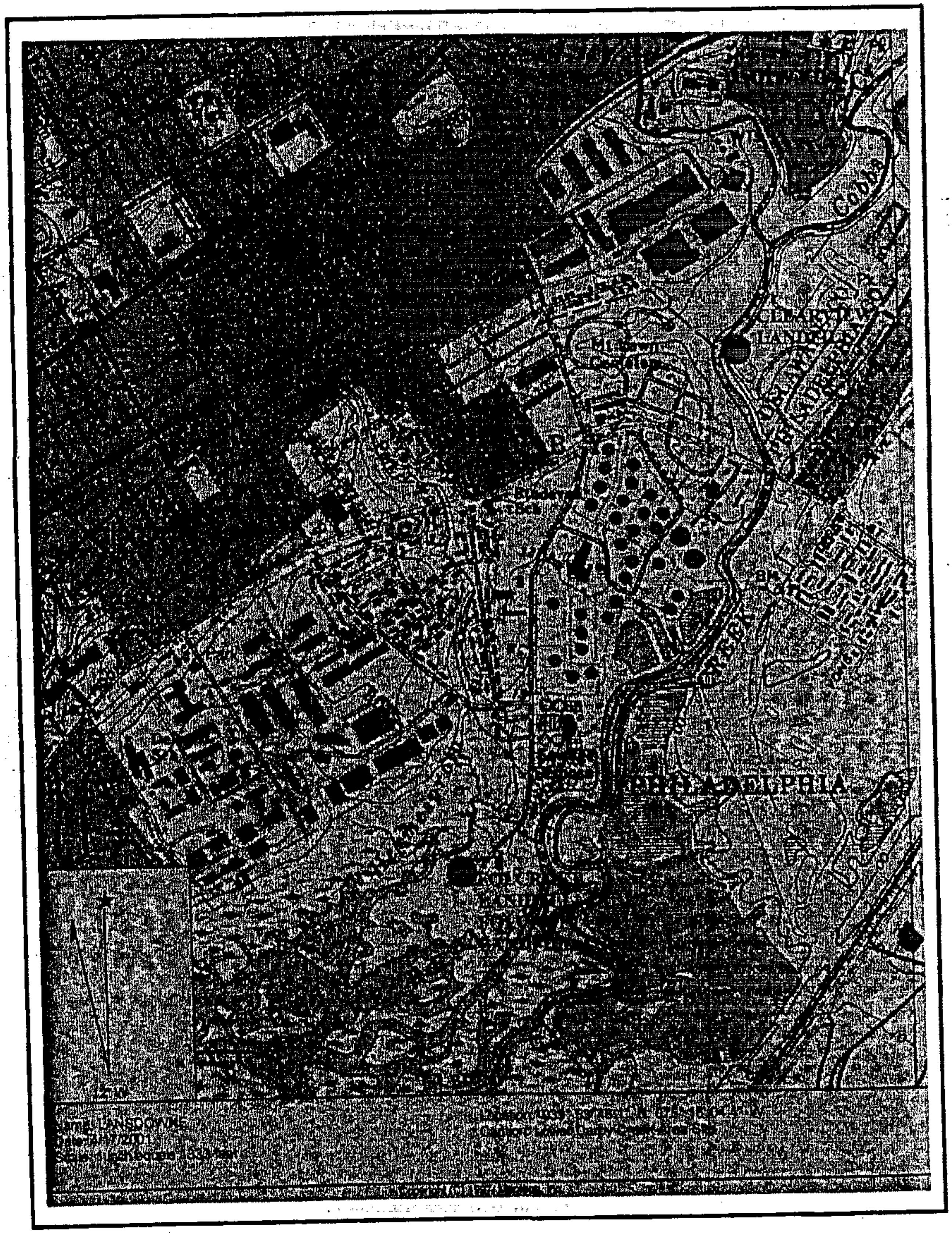
Enclosure A



Enclosure B

Business Confidentiality Claims

You are entitled to assert a claim of business confidentiality covering any part or all of the submitted information, in the manner described in 40 C.F.R. Part 2, Subpart B. Information subject to a claim of business confidentiality will be made available to the public only in accordance with the procedures set forth in 40 C.F.R. Part 2, Subpart B. If a claim of business confidentiality is not asserted when the information is submitted to EPA, EPA may make this information available to the public without further notice to you. You must clearly mark such claimed information by either stamping or using any other such form of notice that such information is a trade secret, proprietary, or company confidential. To best ensure that your intent is clear, we recommend that you mark as confidential each page containing such claimed information.

Disclosure of Your Response to EPA Contractors and Grantees

EPA may contract with one or more independent contracting firms (See "Enclosure C") to review the documentation, including documents which you claim are confidential business information ("CBI"), which you submit in response to this information request, depending on available agency resources. Additionally, EPA may provide access to this information to (an) individual(s) working under (a) cooperative agreements(s) under the Senior Environmental Employee Program ("SEE Enrollees"). The SEE Program was authorized by the Environmental Programs Assistance Act of 1984 (Pub. L. 98-313). The contractor(s) and/or SEE Enrollee(s) will be filing, organizing, analyzing and/or summarizing the information for EPA personnel. The contractors have signed a contract with EPA that contains a confidentiality clause with respect to CBI that they handle for EPA. The SEE Enrollee(s) is working under a cooperative agreement that contains a provision concerning the treatment and safeguarding of CBI. The individual SEE Enrollee has also signed a confidentiality agreement regarding treatment of CBI. Pursuant to Section 104(e)(7) of CERCLA, 42 U.S.C. Section 9604(e)(7) and EPA's regulations at 40 C.F.R. Section 2.310(h), EPA may share such CBI with EPA's authorized representatives which include contractors and cooperators under the Environmental Programs Assistance Act of 1984. (See 58 Fed.Reg. 7187 (1993)). If you have any objection to disclosure by EPA of documents which you claim are CBI to any or all of the entities listed in Enclosure C, you must notify EPA in writing at the time you submit such documents.

Enclosure C

List of Contractors that May Review Your Response

- Daston Corporation -
  Contract #68-S3-01-01
  Subcontractor to Daston Corporation is:
  Dynamac Corporation

- Tetra Tech EM, Inc. -
  Contract #68-S3-0002
  Subcontractor to Tetra Tech EM, Inc. is
  Eagle Instruments, Inc.

- Ecology and Environment, Inc. -
  Contract #68-S3-001
  Subcontractor to Ecology and Environment, Inc. is:
  S & S Engineers, Inc.

- Resource Applications, Inc. -
  Contract #68-S3-003
  Subcontracts to Resource Applications, Inc. are:
  C.C. Johnson & Malhotra, Inc.
  Scientific & Environment Associates, Inc.
  Environmental Quality Management, Inc.

- IT Corporation - Contract #68-S#-00-06
  Subcontracts to IT Corporation are:
  Weavertown Environmental Group
  Environmental Restoration Company

- Earth Tech, Inc. - Contract #68-S3-00-07
  Subcontractors to Earth Tech, Inc. are:
  Industrial Marine Services, Inc.
  Cline Oil
  Hertz Equipment Rental

- Guardian Environmental Services, Inc.
  Contract #68-S3-99-04

- ECG Industries, Inc. -
  Contract #68-S3-99-05
  Subcontractor to ECG Industries, Inc. is:
  Earth Tech, Inc.

- Industrial Marine Services, Inc. -
  Contract #68-S3-99-06
  Subcontractors to Industrial Marine Services, Inc. are:
  Earth Tech, Inc.
  Engineering and Environment, Inc.

- Tetra Tech NUS, Inc. -
  Contract #68-S6-3003
  Subcontractors to Tetra Tech NUS, Inc. are:
  Gannett Flemming, Inc.
  Dynamac Corporation
  C.C. Johnson & Malhotra, P.C.

- CDM-Federal Programs Corporation -
  Contract #68-S7-3003
  Subcontractors to CDM-Federal Programs Corporation are:
  Tetra Tech EM, Inc.
  Robert Kimball & Associates
  PMA & Associates
  Horne Engineering
  Pacific Environmental Services

- Black and Veatch Waste Science and Technology Corporation/Tetra Tech, Inc.
  Contract #68-S7-3002

- Universe Technologies -
  Contract #68-S3-99-02

- Tech Law, Inc.- Contract #68-W-00-108
  Subcontractor to Tech Law, Inc. is:
  Gannett Flemming, Inc.

List of Cooperative Agreements

- National Association of Hispanic Elderly - #CQ-822511

- AARP Foundation (Senior Environmental Employment) - #824021, #823952

Enclosure D

Definitions

- The term "arrangement" shall mean every separate contract or other agreement or understanding between two or more persons, whether written or oral.

- The term "documents" shall mean writings, photographs, sound or magnetic records, drawings, or other similar things by which information has been preserved and also includes information preserved in a form which must be translated or deciphered by machine in order to be intelligible to humans. Examples of documents include, but are not limited to, electronic mail and other forms of computer communication, drafts, correspondence, memoranda, notes, diaries, statistics, letters, telegrams, minutes, contracts, reports, studies, checks, statements, receipts, summaries, pamphlets, books, invoices, checks, bills of lading, weight receipts, toll receipts, offers, contracts, agreements, deeds, leases, manifests, licenses, permits, bids, proposals, policies of insurance, logs, inter-office and intra-office communications, notations of any conversations (including, without limitation, telephone calls, meetings, and other communications such as e-mail), bulletins, printed matter, computer printouts, invoices, worksheets, graphic or oral records or representations of any kind (including, without limitation, charts, graphs, microfiche, microfilm, videotapes, recordings and motion pictures), electronic, mechanical, magnetic or electric records or representations of any kind (including, without limitation, tapes, cassettes, discs, recordings and computer memories), minutes of meetings, memoranda, notes, calendar or daily entries, agendas, notices, announcements, maps, manuals, brochures, reports of scientific study or investigation, schedules, price lists, data, sample analyses, and laboratory reports.

- The term "hazardous substance" means (a) any substance designated pursuant to section 1321(b)(2)(A) of Title 33 [of the U.S. Code], (b) any element, compound, mixture, solution, or substance designated pursuant to section 9602 of [CERCLA], (c) any hazardous waste having the characteristics identified under or listed pursuant to section 3001 of the Solid Waste Disposal Act (42 U.S.C. Section 6921) (but not including any waste the regulation of which under the Solid Waste Disposal Act (42 U.S.C. Section 6901 et seq.) has been suspended by Act of Congress), (d) any toxic pollutant listed under section 1317(a) of Title 33, (e) any hazardous air pollutant listed under section 112 of the Clean Air Act (42 U.S.C. Section 7412), and (f) any imminently hazardous chemical substance or mixture with respect to which the Administrator has taken action pursuant to section 2606 of Title 15 [of the U.S. Code]. The term does not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under subparagraphs (a) through (f) of this paragraph, and the term does not include natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas).

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- The term "pollutant or contaminant" shall include, but not be limited to, any element, substance, compound, or mixture, including disease-causing agents, which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction) or physical deformations in such organisms or their offspring, except that the term "pollutant or contaminant" shall not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under CERCLA, and shall not include natural gas, liquefied natural gas, or synthetic gas of pipeline quality (or mixtures of natural gas and such synthetic gas).

- The term "release" means any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles containing any hazardous substance or pollutant or contaminant), but excludes (a) any release which results in exposure to persons solely within a workplace, with respect to a claim which such persons may assert against the employer of such persons, (b) emissions from the engine exhaust of a motor vehicle, rolling stock, aircraft, vessel, or pipeline pumping station engine, (c) release of source, byproduct, or special nuclear material from a nuclear incident, as those terms are defined in the Atomic Energy Act of 1954 (42 U.S.C. Section 2011 et seq.), if such release is subject to requirements with respect to financial protection established by the Nuclear Regulatory Commission under section 170 of such Act (42 U.S.C. Section 2210), or, for the purposes of section 9604 of [CERCLA] or any other response action, any release of source byproduct, or special nuclear material from any processing site designated under sections 7912(a)(1) or 7942(a) of [CERCLA], and (d) the normal application of fertilizer.

- The term "waste" or "wastes" shall mean and include any discarded materials including, but not limited to, trash, garbage, refuse, by-products, solid waste, hazardous waste, hazardous substances, pollutants or contaminants, and discarded or spilled chemicals, whether solid, liquid, or sludge.

- The term "you" when referring to an incorporated entity shall mean and include the incorporated entity and its agents and representatives, including, but not limited to, persons directly authorized to transact business on the entity's behalf such as officers, directors, or partners with which the entity is affiliated, employees, accountants, engineers, or other persons who conduct business on the entity's behalf, as well as affiliated entities, including, but not limited to, partnerships, limited liability companies, divisions, subsidiaries, and holding companies.

Enclosure E

Instructions

1. You are entitled to assert a claim of business confidentiality covering any part or all of the information you submit. If you desire to assert a claim of business confidentiality, please see Enclosure B, *Business Confidentiality Claims/Disclosure of Your Response to EPA Contractors and Grantees*. You must clearly mark such information by either stamping or using any other form of notice that such information is a trade secret, proprietary, or company confidential. To ensure to the greatest extent that your intent is clear, we recommend that you mark as confidential each page containing such claimed information.

2. Please provide a separate, detailed narrative response to each question, and to each subpart of each question, set forth in this Information Request. If you fail to provide a detailed response, EPA may deem your response to be insufficient and thus a failure to comply with this Information Request, which may subject you to penalties.

3. Precede each response with the number of the question or subpart of the question to which it corresponds. For each document or group of documents produced in response to this Information Request, indicate the number of the specific question or subpart of the question to which the document(s) responds.

4. Should you find at any time after submission of your response that any portion of the submitted information is false, misrepresents the truth or is incomplete, you must notify EPA of this fact and provide EPA with a corrected written response.

5. Any terms that are used in this Information Request and/or its Enclosures that are defined in CERCLA shall have the meaning set forth in CERCLA. Definitions of several such terms are set forth in Enclosure D, *Definitions*, for your convenience. Also, several additional terms not defined in CERCLA are defined in Enclosure D. Those terms shall have the meaning set forth in Enclosure D any time such terms are used in this Information Request and/or its Enclosures.

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Enclosure F

QUESTIONS

1. What is the current nature of the business or activity conducted at U.S. Army Reserve facilities in the Philadelphia, Pennsylvania area? What was the nature of your business or activity between 1958 and 1976? Please describe in detail. If the nature of your business or activity changed from the period of 1958 to 1976 to the present, please provide a detailed explanation of the changes to date.

2. Identify all persons currently or formerly employed by the U.S. Army Reserve who have or may have personal knowledge of your operations and waste disposal practices between 1958 and 1976 at your facilities in the Philadelphia, Pennsylvania area. For each such person, state that person's employer, job title, dates of employment, current address, and telephone number. If the current telephone number or address is not available, provide the last known telephone number or last known address of such person.

3. Describe the types of documents generated or maintained by your facility(ies) in the Philadelphia, Pennsylvania area concerning the handling and/or generation, storage, treatment, transportation, recycling, formulation, or disposal of any hazardous substance, hazardous waste, pollutant, contaminant or other waste between 1958 and 1976.

   a. Provide a description of the information included in each type of document and identify the person who was/is the custodian of the documents;

   b. Describe any permits or permit applications and any correspondence between your company and/or establishment(s), and any regulatory agencies regarding the transportation and disposal of such wastes; and

   c. Describe any contracts or correspondence between your company and/or establishment(s) and any other company or entity regarding the transportation and disposal of such wastes.

4. Identify every hazardous substance used, generated, purchased, stored, or otherwise handled at your establishment(s) in the Philadelphia, Pennsylvania area between 1958 and 1976. Provide chemical analyses and Material Safety Data Sheets ("MSDS"). With respect to each such hazardous substance, further identify:

   a. The process(es) in which each hazardous substance was used, generated, purchased, stored, or otherwise handled;

   b. The chemical composition, characteristics, and physical state (solid, liquid, or gas) of each such hazardous substance;

   c. The annual quantity of each such hazardous substance used, generated, purchased, stored, or otherwise handled;

d. The beginning and ending dates of the period(s) during which such hazardous substance was used, generated, purchased, stored, or otherwise handled;

e. The types and sizes of containers in which these substances were transported and stored; and

f. The persons or companies that supplied each such hazardous substance to your company.

5. Identify all by-products and wastes generated, stored, transported, treated, disposed of, released, or otherwise handled by your establishment(s) in the Philadelphia, Pennsylvania area between 1958 and 1976. With respect to each such by-product and waste identified, further provide:

a. The process(es) in which each such by-product and waste was generated, stored, transported, treated, disposed of, released, or otherwise handled;

b. The chemical composition, characteristics, and physical state (solid, liquid, or gas) of each such by-product or waste;

c. The annual quantities of each such by-product and waste generated, stored, transported, treated, disposed of, released, or otherwise handled;

d. The types, sizes, and numbers of containers used to treat, store, or dispose of each such by-product or waste;

e. The name of the individual(s) and/or company(ies) that disposed of or treated each such by-product or waste; and

f. The location and method of treatment and/or disposal of each such by-product or waste.

6. Did U.S. Army Reserve ever contract with, or make arrangements with Clearview, Folcroft, Folcroft Annex, Eastern Industrial, Tri-County Hauling, S. Buckly Trash Hauling, Barratt Rupurt, McCloskey Engineering, ABM Disposal Services, Marvin Jonas, Jonas Waste Removal, Paolino Company, Schiavo Bros., Inc., Gene Banta trash Hauling, and/or any other company or municipality to remove or transport material from your establishment(s) in the Philadelphia, Pennsylvania area between 1958 and 1976 for disposal? If so, for each transaction identified above, please identify:

a. The person with whom you made such a contract or arrangement;

b. The date(s) on which or time period during which such material was removed or transported for disposal;

c. The nature of such material, including the chemical content, characteristics, and physical state (i.e., liquid, solid, or gas);

d. The annual quantity (number of loads, gallons, drums) of such material;

e. The manner in which such material was containerized for shipment or disposal;

f. The location to which such material was transported for disposal;

g. The person(s) who selected the location to which such material was transported for disposal;

h. The individuals employed with any transporter identified (including truck drivers, dispatchers, managers, etc.) with whom your establishment dealt concerning removal or transportation of such material; and

i. Any billing information and documents (invoices, trip tickets, manifests, etc.) in your possession regarding arrangements made to remove or transport such material.

7. Provide the names, titles, areas of responsibility, addresses, and telephone numbers of all persons who, between 1958 and 1976, may have:

a. Disposed of or treated materials at Clearview, Folcroft and Folcroft Annex or other areas of the Site;

b. Arranged for the disposal or treatment of materials at Clearview, Folcroft and Folcroft Annex or other areas of the Site; and/or

c. Arranged for the transportation of materials to Clearview, Folcroft and Folcroft Annex or other areas of the Site (either directly or through transshipment points) for disposal or treatment.

8. For every instance in which your establishment(s) disposed of or treated material at Clearview, Folcroft and Folcroft Annex or other areas of the Site, or arranged for the disposal or treatment of material at the Site, identify:

a. The date(s) on which such material was disposed of or treated at the Site;

b. The nature of such material, including the chemical content, characteristics, and physical state (i.e., liquid, solid, or gas);

c. The annual quantity (number of loads, gallons, drums) of such material;

d. The specific location on the Site where such material was disposed of or treated; and

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e. Any billing information and documents (invoices, trip tickets, manifests, etc.) in your company's or establishment's(s') possession regarding arrangements made to dispose of or treat such material at the Site.

9. Did your establishment(s), or any other company or individual ever spill or cause a release of any chemicals, hazardous substances, and/or hazardous waste, and/or non-hazardous solid waste on any portion of Clearview, Folcroft and Folcroft Annex or any other portion of the Site? If so, identify the following:

   a. The date(s) the spill(s)/release(s) occurred;

   b. The composition (i.e., chemical analysis) of the materials which were spilled/released;

   c. The response made by you or on your behalf with respect to the spill(s)/release(s); and

   d. The packaging, transportation, and final disposition of the materials which were spilled/released.

10. Please identify individuals employed by U.S. Army Reserve who were responsible for arranging for the removal and disposal of wastes, and individuals who were responsible for payments, payment approvals, and record keeping concerning such waste removal transactions at your Philadelphia, Pennsylvania area establishment(s) between 1958 and 1976. Provide current or last known addresses and telephone numbers where they may be reached. If these individuals are the same persons identified by your answer to question 3, so indicate.

11. Did you or any person or entity on your behalf ever conduct any environmental assessments or investigations relating to contamination at Clearview, Folcroft and Folcroft Annex or any other areas of the Site? If so, please provide all documents pertaining to such assessments or investigations.

12. If you have any information about other parties who may have information which may assist the EPA in its investigation of the Site, including Clearview, Folcroft and Folcroft Annex, or who may be responsible for the generation of, transportation to, or release of contamination at the Site, please provide such information. The information you provide in response to this request should include the party's name, address, telephone number, type of business, and the reasons why you believe the party may have contributed to the contamination at the Site or may have information regarding the Site.

13. Representative of your establishment(s):

   a. Identify the person(s) answering these questions on behalf of your establishment(s), including full name, mailing address, business telephone number, and relationship to the company.

b. Provide the name, title, current address, and telephone number of the individual representing your establishment(s) to whom future correspondence or telephone calls should be directed.

14. If any of the documents solicited in this information request are no longer available, please indicate the reason why they are no longer available. If the records were destroyed, provide us with the following:

a. Your document retention policy;

b. A description of how the records were/are destroyed (burned, archived, trashed, etc.) and the approximate date of destruction;

c. A description of the type of information that would have been contained in the documents; and

d. The name, job title, and most current address known to you of the person(s) who would have produced these documents; the person(s) who would have been responsible for the retention of these documents; and the person(s) who would have been responsible for the destruction of these documents.

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CERCLIS Hazardous Waste Sites

LOWER DARBY CREEK AREA

Operable Units

Site Info | Actions | Aliases | Financial |

OU ID	OU Name
00	SITEWIDE
01	CLEARVIEW LANDFILL
02	FOLCROFT DUMP

[Back to TOP]

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EPA United States Environmental Protection Agency

Superfund

CERCLIS

ARCHIVED SITES | RODS | DED | ORDER PRODUCTS

Contact Us

Site Info Home

Superfund Home

EPA Home

Disclaimer

CERCLIS Hazardous Waste Sites

LOWER DARBY CREEK AREA

Site Information

Actions | Aliases | Financial | Op Units | RODs

Site Name: LOWER DARBY CREEK AREA
Street: DARBY CRK BETWEEN
COBBS CRK AND DELAWARE RIVER
City / State / Zip: DARBY TWP, PA 19023

EPA ID: PASFN0305521
EPA Region: 03
County: DELAWARE

Latitude: +39.885556
Longitude: -075.267778

NPL Status: Currently on the Final NPL
Non-NPL Status: HRS Package Completed - Further Evaluation Needed
Federal Facility Flag: Not a Federal Facility
Incident Category:

[Back to TOP]

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EPA United States Environmental Protection Agency

Superfund

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Site Info Home

Superfund Home

EPA Home

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LOWER DARBY CREEK AREA

Actions

Site Info | Aliases | Op Units | Financial | RODs

OU	Action Name	Qualifier	Lead	Actual Start	Actual Completion
00	DISCOVERY		F		01/07/1998
00	SITE INSPECTION	H	F	01/07/1998	08/17/1999
00	HRS PACKAGE	O	F	09/01/1999	05/01/2000
00	PROPOSAL TO NPL		F		05/11/2000
00	FINAL LISTING ON NPL		F		06/14/2001

[Back to TOP]

EPA United States Environmental Protection Agency

Superfund

CERCLIS

ARCHIVED SITES | RODS | DED | ORDER PRODUCTS

Contact Us

Site Info Home

Superfund Home

EPA Home

Disclaimer

CERCLIS Hazardous Waste Sites

LOWER DARBY CREEK AREA

Financial Transactions

Site Info | Actions | Aliases | Op Units | RODs

OU	Action Name	Fin Id	Fin Type	Fin Date	$ Amount
00	HAZRANK	0006	Actual Ob	06/16/2000	13230
00	HAZRANK	0012	Actual Ob	10/16/2000	237
00	HAZRANK	0011	Actual Ob	09/20/2000	19
00	HAZRANK	0010	Actual Ob	08/09/2000	3130
00	HAZRANK	0009	Actual Ob	08/08/2000	20
00	HAZRANK	0007	Actual Ob	07/12/2000	98
00	HAZRANK	0005	Actual Ob	06/16/2000	624
00	HAZRANK	0004	Actual Ob	05/30/2000	34
00	HAZRANK	0003	Actual Ob	05/24/2000	4252
00	HAZRANK	0002	Actual Ob	04/24/2000	33660
00	HAZRANK	0001	Actual Ob	04/24/2000	13445
00	HAZRANK	0013	Actual Ob	12/11/2000	200
00	HAZRANK	0008	Actual Ob	07/21/2000	8050
00	HAZRANK	0008	Deob	07/21/2000	8050
00	HAZRANK	0013	Deob	12/11/2000	200
00	HAZRANK	0012	Deob	10/16/2000	237
00	HAZRANK	0011	Deob	09/20/2000	19
00	HAZRANK	0010	Deob	08/09/2000	3130
00	HAZRANK	0009	Deob	08/08/2000	20
00	HAZRANK	0006	Deob	06/16/2000	13230
00	HAZRANK	0005	Deob	06/16/2000	624
00	HAZRANK	0004	Deob	04/20/2000	33660
00	HAZRANK	0003	Deob	05/30/2000	34
00	HAZRANK	0001	Deob	04/20/2000	13445
00	HAZRANK	0002	Deob	05/24/2000	4252
00	HAZRANK	0007	Deob	07/07/2000	98
00	HAZRANK	0007	Outlay	07/07/2000	98
00	HAZRANK	0013	Outlay	12/11/2000	200
00	HAZRANK	0012	Outlay	10/16/2000	237
00	HAZRANK	0011	Outlay	09/20/2000	19

00	HAZRANK	0010	Outlay	08/09/2000	3130
00	HAZRANK	0008	Outlay	07/21/2000	8050
00	HAZRANK	0005	Outlay	06/16/2000	624
00	HAZRANK	0004	Outlay	04/20/2000	33660
00	HAZRANK	0003	Outlay	05/30/2000	34
00	HAZRANK	0002	Outlay	05/24/2000	4252
00	HAZRANK	0001	Outlay	04/20/2000	13445
00	HAZRANK	0006	Outlay	06/16/2000	13230
00	HAZRANK	0009	Outlay	08/08/2000	20
00	SI	0001	Actual Ob	04/19/2000	88
00	SI	0002	Actual Ob	04/24/2000	1159
00	SI	0003	Actual Ob	05/30/2000	5509
00	SI	0004	Actual Ob	05/30/2000	2671
00	SI	0002	Deob	04/20/2000	1159
00	SI	0003	Deob	05/30/2000	5509
00	SI	0001	Deob	04/19/2000	88
00	SI	0004	Deob	05/31/2000	2671
00	SI	0001	Deoutlay	05/30/2000	2671
00	SI	0001	Outlay	04/19/2000	88
00	SI	0002	Outlay	04/20/2000	1159
00	SI	0003	Outlay	05/30/2000	5509

[Back to TOP]

EPA United States Environmental Protection Agency

Superfund

CERCLIS | ARCHIVED SITES | RODS | OED | ORDER PRODUCTS

Contact Us
Site Info Home
Superfund Home
EPA Home
Disclaimer

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CLEARVIEW LANDFILL

Site Information

Actions | Aliases | Financial | Op Units | RODs

Site Name:CLEARVIEW LANDFILL
Street:83RD & BUIST AVE
City / State / Zip:DARBY TWP, PA 19023

EPA ID:PAD980693162
EPA Region:03
County:DELAWARE

NPL Status: Site is Part of NPL Site
Non-NPL Status:
Federal Facility Flag: Not a Federal Facility
Incident Category:

[Back to TOP]

EPA Home | OSWER Home | Superfund Home
Search EPA | Contact Us
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brown.margret@epa.gov

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Contact Us

Site Info Home

Superfund Home

EPA Home

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CERCLIS Hazardous Waste Sites

CLEARVIEW LANDFILL

Actions

Site Info | Aliases | Op Units | Financial | RODs

OU	Action Name	Qualifier	Lead	Actual Start	Actual Completion
00	DISCOVERY		F		11/01/1981
00	PRELIMINARY ASSESSMENT	L	F		01/01/1982
00	SITE INSPECTION	N	F	10/01/1983	06/01/1984
00	SITE REASSESSMENT	A	F	01/07/1998	08/17/1999

[Back to TOP]

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Contact Us

Site Info Home

Superfund Home

EPA Home

Disclaimer

CERCLIS Hazardous Waste Sites

FOLCROFT DUMP

Site Information

Actions | Aliases | Financial | Op Units | RODs

Site Name: FOLCROFT DUMP
Street: CALCON HOOK RD
City / State / Zip: DARBY, PA 19023

EPA ID: PAD980508576
EPA Region: 03
County: DELAWARE

NPL Status: Site is Part of NPL Site
Non-NPL Status:
Federal Facility Flag: Not a Federal Facility
Incident Category:

[Back to TOP]

EPA United States Environmental Protection Agency

Superfund

CERCLIS

ARCHIVED SITES | RODS | DED | ORDER PRODUCTS

Contact Us

Site Info Home

Superfund Home

EPA Home

Disclaimer

CERCLIS Hazardous Waste Sites

FOLCROFT DUMP

Actions

Site Info | Aliases | Op Units | Financial | RODs

OU	Action Name	Qualifier	Lead	Actual Start	Actual Completion
00	DISCOVERY		F		11/01/1979
00	PRELIMINARY ASSESSMENT	L	F		07/01/1980
00	SITE INSPECTION	N	F	10/01/1980	11/01/1980
00	SITE REASSESSMENT	A	F	01/07/1998	08/17/1999

[Back to TOP]

U.S. Environmental Protection Agency

Region 3: Mid-Atlantic Region
Hazardous Site Cleanup Division

Serving: Delaware, District of Columbia, Maryland, Pennsylvania, Virginia, West Virginia

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EPA Home > OSWER Home > Region 3 HSCD > Pennsylvania Superfund Sites > Lower Darby Creek

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Brownfields / Redevelopment Initiatives
Administrative Record
Risk Assessment / RBC Tables
Resources
Oil Pollution
Chemical Emergency Preparedness and Prevention (CEPP)
Freedom of Information Act Requests (FOIA)
For KIDS
FIRSTGOV

Current Site Information (NPL Pad)

EPA Region 3
Pennsylvania
The border between Philadelphia and Delaware Counties

EPA ID# PASFN0305521

1st and 7th Congressional District

Last Update: February 2002

Other Names:
Clearview Landfil
Folcroft Landfill

Current Site Status

The U.S. Environmental Protection Agency placed the Lower Darby Creek Area on the National Priorities List in June 2001. The site consists of two landfills: the Clearview Landfill and the Folcroft Landfill and Annex. EPA held a meeting in September 2001 to inform the community that the Lower Darby Creek Area is now classified as a Superfund site. EPA will conduct a Remedial Investigation of the Clearview Landfill. This investigation will include comprehensive environmental sampling of the soil, groundwater, and creek water to determine the type of contaminants and the spread of contamination. EPA is currently working on a plan for the Remedial Investigation. The next steps include approving the plan, having a health and safety plan, and gaining access to the properties for sampling. Once these steps are completed sampling can begin sometime in the Spring-Summer 2002.

Site Description

The Lower Darby Creek Area site consists of two landfills, the Clearview Landfill and the Folcroft Landfill and Annex, along Darby Creek in Philadelphia and Delaware Counties. Clearview Landfill is on the east side of Darby Creek and about two miles downstream is the Folcroft Landfill/Annex on the west side of Darby Creek. The Folcroft Landfill/Annex is part of the John Heinz National Wildlife Refuge and managed by the Fish and Wildlife Service. The two landfills operated from the 1950's to the 1970's and were eventually closed in the mid-1970's. During operation they disposed of a variety of waste including municipal, demolition, and hospital waste.

Site Responsibility

EPA will be the lead agency in cleaning up the Clearview Landfill. The U.S. Fish and Wildlife Service owns the Folcroft Landfill and Annex as part of the John Heinz National Wildlife Refuge and, therefore, will be the lead on the cleanup.

NPL Listing History

Our country's most serious, uncontrolled, or abandoned hazardous waste sites can be cleaned using federal money. To be eligible for federal cleanup money, a site must be on the National Priorities List. This site was proposed to the list on May 11, 2000 and formally added to the list June 14, 2001. When the site was proposed to the list in 2000, it consisted of seven

are completed sampling can begin sometime in the Spring-Summer 2002.

Contacts

Kristine Matzko
Remedial Project Manager
215-814-5719
matzko.kristine@epa.gov

Hal Yates
Community Involvement Coordinator
215-814-5530
yates.hal@epa.gov

Cynthia Yu
Governmental Liaison
215-814-5557
yu.cynthia@epa.gov

properties), the Sunoco Darby Creek Tank Farm, the former Delaware County Sewage Treatment Plant, the former Delaware County Incinerator, and the Folcroft Landfill and Folcroft Landfill Annex.

Each of these six properties or groups of properties contains waste disposal areas or other sources of contaminants. The Clearview Landfill and the Folcroft Landfill and Annex were used for the disposal of municipal waste between the late 1950s and early 1970s. The Industrial Drive properties were the location of a dump in the 1950s and are currently occupied by salvage yards, vehicle repair shops, and other businesses. The Sunoco (formerly Gulf Oil) Darby Creek Tank Farm property is a crude oil tank storage facility, constructed in the late 1940s and early 1950s over a rock quarry filled in with wastes from the Philadelphia refinery. The former Delaware County Sewage Treatment Plant operated between the late 1950s and early 1970s and included a sewage sludge disposal area. The former Delaware County Incinerator operated from the mid 1960s until late 1970s, with some of the ash residue generated by the incinerator being landfilled in surrounding areas.

The waste sources on these properties have contributed to a release of hazardous substances into the waters of Darby Creek and other nearby streams. Hazardous substances of concern include heavy metals, polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs), and dioxin. The release of these substances into Darby Creek poses a threat to people who might consume fish from the creek, as well as an ecological threat to wetland areas and other sensitive environments. Of special concern is the 1200-acre John Heinz National Wildlife Refuge, which includes the largest remaining freshwater tidal marsh in Pennsylvania.

A 60-day public comment period on the proposed Superfund listing begins on May 11 and runs through July 10. Documents are available for review at the EPA Region III Superfund Docket in Philadelphia, and also at two local information repositories: the Sharon Hill Public Library (Sharon Ave. & Spring St., Sharon Hill, Pa., 610-586-3993) and the Eastwick Branch of the Philadelphia Free Library (2851 Island Ave., near Lindbergh Blvd., 215-685-4170). For additional information, please contact the EPA Region III Superfund Docket at (215) 814-5364. Selected scoring materials and related information is also available on the Internet at www.epa.gov/super/new/newnpl.htm

EPA will hold an Availability Session for the local community on Monday, June 5 in the evening. An exact time will be announced in local newspapers prior to the meeting. EPA experts will be on hand to answer questions about the site, the Superfund process, and opportunities for public input. The Availability Session will be held at the Delaware County Emergency Services Training Center, located at southern end of Calcon Hook Rd. in Folcroft, Delaware County, Pa.

United States Environmental Protection Agency, 1650 Arch Street, Philadelphia, PA 19103-2029
Phone: (800) 438-2474

Background samples were also collected upstream of waste sources along Darby and Cobbs Creeks, as well as from a tidal wetland in New Jersey, for comparison purposes.

Known or Probable Sources of Contamination

EPA's sampling has identified several known or probable sources of contamination in the Lower Darby Creek Area. These waste sources include the Folcroft Landfill and Folcroft Landfill Annex, the Clearview Landfill, the Darby Creek Tank Farm, the former Delaware County Sewage Treatment Plant, the former Delaware County Incinerator and commercial properties located along Industrial Drive.

Results from EPA's sampling indicate that contaminants are associated with all of the aforementioned sources. Heavy metals such as antimony, copper, lead and zinc are related to each source to varying degrees. Other contaminants are more source-specific such as volatile organic compounds (VOCs) in ground water at the Folcroft Landfill, PCBs at the Clearview Landfill, dioxin at the former Delaware County Incinerator and benzene in ground water at the Darby Creek Tank Farm. A comparison between surface water and sediment samples collected at background locations and locations downstream of waste sources indicates the presence of various heavy metals, PCBs and dioxin in Darby and/or Hermesprota Creeks.

Contamination detected during sampling are impacting (or could potentially impact) humans or environmental resources; in particular, the wildlife refuge itself, wetlands and human food chain organisms (e.g., fish consumed by humans despite posted warnings). Therefore, EPA is recommending that the Lower Darby Creek Area become eligible for Federal cleanup funds. Each of the waste sources and associated contaminants are discussed below.

The Folcroft Landfill and Folcroft Landfill Annex occupy approximately 46 acres and 16 acres, respectively. These landfills, which operated from the late 1950s to the early 1970s, reportedly received municipal waste, industrial waste, hospital waste, incinerator ash and sewage sludge. Wastes were placed in wetland areas along the edges of Darby, Hermesprota and Thoroughfare Creeks. During the 1998 sampling effort, EPA observed signs of erosion on the landfill cover and the presence of leachate seeps. Ground water samples collected by EPA show contamination by heavy metals and VOCs, while heavy metals were detected in a soil sample.

The former Delaware County Incinerator was used for the incineration of municipal waste. Between the mid 1960s and early 1970s, some of the incinerator ash was reportedly placed in an area located immediately to the south. Subsurface sampling of this fill area by EPA indicates the presence of contaminants such as heavy metals and very low levels of dioxin. This area is now the location of the Delaware County Emergency Services Training Center.

The former Delaware County Sewage Treatment Plant discharged directly to Darby Creek until the early 1970s. Sewage sludge was reportedly disposed in sludge beds alongside Darby Creek. Soil samples collected by EPA show contamination by heavy metals and PCBs.

The Darby Creek Tank Farm, which was constructed by Gulf Oil on a former rock quarry in the early 1950s, is currently owned and operated by Sun Oil. Excavated areas of the tank farm were previously filled with waste materials, including oily sludge, from the Philadelphia refinery. Sampling performed by EPA shows contamination of ground water by heavy metals and benzene. EPA also observed a thick oily substance overlying ground water.

release of contaminants from waste sources and the resulting potential for exposure to these contaminants. EPA observed that contaminants have been released from waste sources to ground water and surface water. Waste sources include landfills, buried wastes and contaminated soil. These contaminants include heavy metals, solvents such as VOCs, others organic compounds such as PAHs, PCBs and dioxin. Some of these contaminants are toxic, persistent in the environment and/or accumulate in fish tissue.

Environmental receptors such as aquatic life are likely to be affected because certain contaminants are present in surface water at levels exceeding Federal water quality criteria. Humans could be affected by consuming fish or by coming into direct contact with contamination.

The Decision Process

In order to add a site to the NPL, EPA's Regional Office prepares a formal HRS package, which includes all the documentation necessary to support NPL listing, for review by EPA Headquarters. Once EPA Headquarters approves the HRS package, a site is proposed to the NPL by rulemaking in a Federal Register notice. The anticipated date for NPL proposal of the Lower Darby Creek Area is Spring 2000. NPL proposal is then followed by a 60-day public comment period. EPA considers all relevant comments received during the comment period. After the comment period, EPA determines whether to place a site to the final NPL. EPA's final decision is announced in another Federal Register rule at which time EPA explains its decision in writing.

EPA Considers Land-Use Issues

EPA is involved in two peripheral land use issues at the John Heinz National Wildlife Refuge. First, EPA is determining the extent to which it should become involved with potential environmental issues related to construction of the Cusano Environmental Education Center. Second, EPA has provided input to the Department of Interior's Fish and Wildlife Service regarding their plans to acquire the former Norwood Landfill property, which would become part of the John Heinz National Wildlife Refuge. Neither of these issues has impacted EPA's decision whether to include the Lower Darby Creek Area on the NPL.

EPA Contacts

If you have any questions regarding cleanup work at the Lower Darby Creek Area, you may contact the EPA official listed below:

Hal Yates
Senior Community Involvement Coordinator
U.S. Environmental Protection Agency
Region III
(3HS43)
1650 Arch Street
Philadelphia, PA 19103-2029
800-553-2509
215- 814-5530
yates.hal@epa.gov

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

Internet HazDat - Site Contaminants List

More information on building a query

Query Results: 46 Records Found

site_id	cas_id	contaminant	proj_type	
PASFN0305521	001746-01-6	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	HA	Soil depth not specified
PASFN0305521	007440-38-2	ARSENIC	HA	Soil depth not specified
PASFN0305521	000056-55-3	BENZO(A)ANTHRACENE	HA	Sediment, Unspecified
PASFN0305521	000050-32-8	BENZO(A)PYRENE	HA	Sediment, Unspecified
PASFN0305521	000050-32-8	BENZO(A)PYRENE	HA	Sediment, Unspecified
PASFN0305521	000050-32-8	BENZO(A)PYRENE	HC	Sediment, Unspecified
PASFN0305521	000050-32-8	BENZO(A)PYRENE	HA	Soil depth not specified
PASFN0305521	000050-32-8	BENZO(A)PYRENE	HA	Soil depth not specified
PASFN0305521	000050-32-8	BENZO(A)PYRENE	HC	Soil depth not specified
PASFN0305521	007440-43-9	CADMIUM	HA	OTHER Liquids (waste
PASFN0305521	000124-38-9	CARBON DIOXIDE	HA	Soil Gas
PASFN0305521	000124-38-9	CARBON DIOXIDE	HC	Soil Gas
PASFN0305521	007440-47-3	CHROMIUM	HA	OTHER Liquids (waste
PASFN0305521	007440-50-8	COPPER	HA	OTHER Liquids (waste
PASFN0305521	000053-70-3	DIBENZO(A,H)ANTHRACENE	HA	Sediment, Unspecified
PASFN0305521	007439-89-6	IRON	HA	OTHER Liquids (waste
PASFN0305521	007439-92-1	LEAD	HA	OTHER Liquids (waste
PASFN0305521	007439-92-1	LEAD	HA	Soil depth not specified
PASFN0305521	007439-92-1	LEAD	HA	Soil depth not specified
PASFN0305521	007439-97-6	MERCURY	HC	Tap Water
PASFN0305521	HZ0900-01-T	METALS N.O.S.	HA	Not Reported
PASFN0305521	HZ0900-01-T	METALS N.O.S.	HA	OTHER Liquids (waste
PASFN0305521	HZ0900-01-T	METALS N.O.S.	HA	Soil depth not specified
PASFN0305521	HZ0900-01-T	METALS N.O.S.	HA	Soil depth not specified
PASFN0305521	HZ0900-01-T	METALS N.O.S.	HA	Soil depth not specified
PASFN0305521	HZ0900-01-T	METALS N.O.S.	HA	Soil depth not specified
PASFN0305521	HZ0900-01-T	METALS N.O.S.	HA	Soil depth not specified
PASFN0305521	HZ0900-01-T	METALS N.O.S.	HA	Soil depth not specified
PASFN0305521	HZ0900-01-T	METALS N.O.S.	HA	Waste Materials/Contai
PASFN0305521	000074-82-8	METHANE	HA	Soil Gas

ORIGINAL
(Red)

3

ORIGINAL (Red)

Response to Section 104(e), CERCLA, Questionnaire
Lower Darby Creek Superfund Site

1. What is the current nature of the business or activity conducted at U.S. Army Reserve facilities in the Philadelphia, Pennsylvania area? What was the nature of your business or activity between 1958 and 1976? Please describe in detail. If the nature of your business or activity changed from the period of 1958 to 1976 to the present, please provide a detailed explanation of the changes to date.

Answer.

a. Appendix 1 to this questionnaire contains three tables listing U.S. Army Reserve Facilities that were in active between 1958-1976 (Table 1); that are currently active (Table 2); and that were active between 1976 and 2001 (Table 3). Each table also identifies the activities conducted at those sites during the relevant time frames. We have defined the Philadelphia area to include the five Pennsylvania counties immediately surrounding the city: Bucks, Chester, Delaware, Philadelphia, and Montgomery, and three former Nike Sites in New Jersey because of their proximity (e.g., within a 25 mile radius) to the Lower Darby Creek Superfund Site.

b. **Nike Sites**. Between 1958 and 1976, the Army operated 16 facilities in the Philadelphia area; ten (10) of which were former Nike Sites. The Army deployed Nike Ajax and Nike Hercules guided missiles at sites throughout the continental United States to protect major metropolitan areas and strategic military installations from aerial attack between 1954 and the early 1970s. (TAB 4, p 1-1)[1] These sites were operated by active duty Army units on a full-time basis until about 1962 when responsibility for that mission was gradually transferred to National Guard units. (TAB 4, 2-4). Shortly thereafter, many Nike sites were deactivated and then transferred to GSA for disposition outside the federal government; the last Philadelphia area site, PH 41/43 in Gloucester, New Jersey, was deactivated in 1974.

c. Nike Sites usually consisted of two, non-contiguous parcels of land: a command and control parcel and a launch parcel. Occasionally, a site included a third parcel of land which was used as a housing area. (TAB 4, p 4-1) A typical site included a motor pool, generator building, acid pit, and missile assembly buildings. Nike Sites were capable of assembling, maintaining, and fueling missiles and performing organizational level maintenance (i.e., oil changes, tune-ups, and minor repairs) for support equipment and vehicles. (TAB 4, p 6-5)

d. **Reserve Facilities**. Between 1958 and 1976, the Army Reserves acquired three of the deactivated Nike Sites (Bristol, Edgemont, and North Penn) and conducted operations at another six facilities, unassociated with the former Nike Sites.[2] The U.S. Army Reserve is part of the Department of Defense and is the active Army's federal reserve force. It is made up of combat support and combat service support forces that give the active Army the resources it needs to deploy overseas and to sustain combat troops during wartime, contingencies or other operations. Presently, reserve forces stationed in the eastern Pennsylvania area primarily include transportation, medical, logistical, and engineer units. Between 1958 and 1976, the reserve forces also included infantry and field artillery units.

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[1] Information pertaining to the former Nike sites is based on the following documents: U.S. Army Toxic and Hazardous Materials Agency, "Historical Overview of the Nike Missile System", December 1984 (1 vol.) (TAB 4); and U.S. Army, Corps of Engineers, Huntsville Division, "Final Report, Investigation of Former Nike Missile Sites For Potential Toxic and Hazardous Waste Contamination," March 1986 (2 vols.)(TAB 5).

[2] Information pertaining to the Army Reserve facilities and activities in the Philadelphia area is based on the Nike Site reports mentioned in footnote 1, unit historical directories and wire diagrams which identified possible points of contact, and interviews of individuals identified in response to question 2.

e. Typical USAR Centers generally consisted of an administrative facility and sometimes a separate maintenance shop. They were generally located on parcels of land less than 5 acres. Due to a limited construction budget between the 1950s and 1970, few buildings were constructed to house reserve units. The vast majority were structures that often had a prior non-military use. As there was no formal plan or layout for these facilities, site usage parking, equipment storage, and training varied and had to be adopted to local conditions. Equipment storage varied according to type of unit. In general, a unit might keep a number of vehicles such as trucks or jeeps on-site. Combat units might maintain a limited number of tracked vehicles (armored personnel carriers or tanks), but the majority of this type of equipment would be stored off-site at an ECS assessable to a training range.

f. Operations at reserve facilities were fundamentally different than those at the Nike Sites in several regards. The first major difference pertained to manning levels. Historically, reserve units have drilled one weekend a month and conducted annual training, that is, full-time training two weeks during the summer. At all other times, reserve units and facilities are manned by a few full-time individuals, referred to as unit administrators, who handle routine administrative functions. The second major difference pertained to equipment and vehicles. Unlike the Nike Sites, reserve units are not always co-located with most of their equipment and vehicles; instead, these items were stored at equipment concentration sites. These sites are typically located on active duty military installations because they provide continuous physical security and access to suitable maintenance facilities and training areas (e.g., rifle or field artillery ranges, maneuver areas). Reserve units in the Philadelphia area used Fort Indiantown Gap, in Annville, Pennsylvania, to store and maintain their equipment and vehicles. Finally, because of the reduced manning levels within the reserves and in order to achieve economic efficiencies, the Army established an area support program under which designated installations were responsible for providing services necessary to support military units and activities in specified geographic regions. (TAB 6, paragraph 5.a)[3] Fort Indiantown Gap, or Indiantown Gap Military Reservation as it was known before it became an active duty post, was designated as the Area Support Coordinating Installation for reserve units throughout Pennsylvania and West Virginia. Fort Dix carried the same responsibilities for units in New Jersey. Under this program, Fort Indiantown Gap was responsible for providing or coordinating with another installation to provide a variety of logistics services including: procurement, property disposal, and equipment and vehicle maintenance. (TAB 6, Appendix B, Map B-1) As a result of the differences noted above, most waste management activities for reserve forces and the creation of documents associated with those activities, occurred at either Fort Indiantown Gap or Fort Dix. During the 1990s, the active duty missions at both installations were terminated under the Base Closure and Realignment statutes. Now, these bases are devoted exclusively to supporting Army National Guard and U.S. Army Reserve Force missions.

[3] Army Regulation (AR) 5-9, *Intraservice Support, Installation Area Coordination*, 17 May 1974.

Response to Section 104(e), CERCLA, Questionnaire
Lower Darby Creek Superfund Site

2. Identify all person currently or formerly employed by the U.S. Army Reserves who have or may have personal knowledge of your operations and waste disposal practices between 1958 and 1976 at your facilities in the Philadelphia, Pennsylvania area. For each such person, state that person's employer, job title, dates of employment, current address, and telephone number. If the current telephone number or address is not available, provide the last known telephone number or last known address of such person.

Answer.

a. Mr. Cal Bowser, Chief, Maintenance Section, Deputy Chief of Staff for Logistics, 99th Reserve Support Command, 99 Soldier Lane, Moon Township, PA 15108 (412) 604-8377. Served as Heavy Mobile Equipment Repairer & Tools & Parts Specialist at Area Organizational Maintenance Site (AOMS) # 104, Greensburg, PA (99th ARCOM) from Jan 70 to Jul 77; Equipment Specialist at Readiness Group, Oakdale, PA (supporting the 99th ARCOM) from Jul 77 to Aug 80; Heavy Mobile Equipment Repairer Leader at Area Maintenance Support Activity (AMSA) #103, Franklin, PA (99th ARCOM) from Aug 80 to Jul 85; Heavy Mobile Equipment Repairer Supervisor at Equipment Concentration Site #103, Franklin, PA (99th ARCOM) from Jul 85 to Aug 88; Heavy Mobile Equipment Repairer Supervisor at AMSA #106, Punxsutawney, PA (99th ARCOM) from Aug 88 to Aug 90; Supervisory Equipment Specialist, 99th ARCOM, Oakdale, PA from Aug 90 to Oct 95; Supervisory Equipment Specialist 99th Reserve Support Command (RSC), Oakdale, PA from Oct 95 to Sept 97; and Supervisory Maintenance Management Specialist 99th RSC Oakdale/Coraopolis PA from Sept 97 to present. Is generally familiar with waste management practices associated with maintenance activities from 1970 present. Recalls that waste oil was poured on the ground to control weed growth or was transferred to vendors for commercial reasons or to municipalities for dust suppression or to undercoat vehicles. Recalls that solvents such as, Stoddard Solvents, PD-680, methyl ethyl ketone, in 2 to 5 gallon containers were used to clean garage floors and equipment parts. Occasionally waste solvents were poured in drains and waste rags were thrown in the trash for disposal. Recalls that the acid was drained from old batteries into lined pits and then neutralized using baking soda or limestone rock and the battery casing was turned in for recycling. Recalls instances where the battery casing was given to the City of Reading which used shredded casing as fill for road material. Is generally familiar with manning practices of reserve units beginning in mid to late 1960s (16 hours of reserve training was conducted a month usually on one Sunday a month and then two Wednesdays a month). Recalls that most reserve equipment was stored at Fort Indiantown Gap and that most maintenance activities took place there or during annual training.

b. Mr. Raymond Bevan, Supervisor, Equipment Concentration Site #24, Building 10-83, Fort Indiantown Gap, Annville, PA 17003-5015 (717) 861-2165. Served as a mechanic for Area Organization Maintenance Shop (AOMS), Army Reserves, in Reading, Pennsylvania from 1970 to 1978. Served as supervisor of Equipment Concentration Site 24, Fort Indiantown Gap, Pennsylvania from 1978 to the present. Is generally familiar with waste management practices associated with maintenance activities from 1970 to the present. Recalls that some waste oil and filters were placed in dumpsters and hauled as municipal waste or poured in drains or directly on to the ground. Has no recollection whether waste oil was collected for resale or disposal. Recalls that used batteries were shipped to the Naval Shipyard in Philadelphia for disposal. Recalls that full-time manning of reserve centers with administrative staff did not begin until about 1976.

Response to Section 104(e), CERCLA, Questionnaire
Lower Darby Creek Superfund Site

c. Mr. William Staub, Civilian Executive Officer, 99th Regional Support Command (RSC), 99 Soldier Lane, Moon Township, PA 15108 (412) 604-8002. Served as Civilian Executive Officer from 1985 to 1996 and as a Military Personnel Officer from 1972 to 1985 for the 79th Army Command (ARCOM), Willow Grove, a predecessor organization to the 99th RSC. Is generally familiar with U.S. Army Reserves relying on Fort Indiantown Gap for base operations support, general waste management practices at reserve facilities and reserve manning practices.

d. Walter Wisner, Retired, Facility Management Supervisor, [redacted]. Served as a Military Technician in the Army Reserves and had 43 years of Federal Service. In general, he was familiar with Base Operations practices and the support provide by Active Army Installations, the general history of the Philadelphia Nike System and Logistic practices of the 79th ARCOM.

f. Francis E. Huff, Supervisor, Area Maintenance Support Activity #23 Willow Grove, Bldg. 178, NAS Willow Grove, PA 19090 (215) 443-1654.

ORIGINAL (Red)

3. Describe the types of documents generated or maintained by your facility(ies) in the Philadelphia, Pennsylvania area concerning the handling and/or generation, storage, treatment, transportation, recycling, formulation, or disposal of any hazardous substance, hazardous waste, pollutant, contaminant or other waste between 1958 and 1976.

Answer. Because of the Army's records retention policies, discussed in response to Question 14, the types of records sought in this question no longer exist. Nonetheless, a review of Army record retention policies, discussed in response to Question #14, that were in existence during the relevant time-frame identify some of the typical documents that would have been generated and maintained.

a. Provide a description of the information included in each type of document and identify the person who was/is the custodian of the documents;

Answer. See previous response.

b. Describe any permits or permit applications and any correspondence between your company and /or establishment(s), and any regulatory agencies regarding the transportation and disposal of such wastes.

Answer. Army Components were not required to apply for permits to treat, store, or dispose of or to use manifests to transport hazardous wastes, hazardous substances, pollutants, contaminants or other wastes prior to the passage of the Resource Conservation and Recovery Act in October 1976 and that statute's implementing regulations thereafter.

c. Describe any contracts or correspondence between your company and/or establishment(s) and any other company or entity regarding the transportation and disposal of such wastes.

Answer. The Army's records retention policy in effect during the relevant time frame required the destruction of contract files after 3 years if the value of the contract was less than $2,500 or after 6 years if the value exceeded that amount. Because of that policy, we were unable to locate military documents confirming that the Army Reserve contracted or made arrangements with any companies for the transportation and disposal of wastes during the relevant time periods.

ORIGINAL (Red)

4. Identify every hazardous substance used, generated, purchased, stored, or otherwise handled at your establishment(s) in the Philadelphia, Pennsylvania area between 1958 and 1976. Provide chemical analyses and Materiel Safety Data Sheets ("MSDS"). With respect to each such hazardous substance, further identify:

Answer.

a. **Nike Sites**. Hazardous substances used or stored during the operational life of Nike Sites included: liquid missile fuel (JP-4 jet fuel (TAB 4, p 5-5)); solid missile fuel (ammonium perchlorate (TAB 4, p 5-12)), starter fluids (unsymmetrical dimethyl hydrazine, aniline, furfuryl alcohol, (TAB 4, p 5-5)) oxidizer (inhibited red fuming nitric acid (TAB 4, pp 4-4, 7-6)); hydrocarbons (motor oil, hydraulic fluid, diesel fuel, gasoline, heating oil (TAB 4, p 6-5)), solvents (carbon tetrachloride, trichloroethane, trichloroethylene, Stoddard solvent or PD-680, toluene, acetone and alcohol (TAB 4, p 6-5)), polychlorinated biphenyls (TAB 4, p 4-5), ethylene oxide, liquid electrolyte batteries (TAB 4, p 6-9).

b. **Reserve Facilities**. Hazardous substances used or stored during the operation of reserve facilities included: hydrocarbons (motor oil, hydraulic fluid, diesel fuel, gasoline, solvents (carbon tetrachloride, trichloroethane, trichloroethylene, Stoddard solvent or PD-680, toluene, acetone and alcohol, polychlorinated biphenyls, and liquid electrolyte batteries.

Material Safety Data Sheets for these substance are at TAB 7 in alphabetical order.

a. The process(es) in which each hazardous substance was used, generated, purchased, stored, or otherwise handled;

Answer. At Nike Sites, the hazardous substances were used or otherwise handled during the following operations: fueling, missile assembly, maintenance and repair of support equipment, vehicles and facilities, and handling and storage of materiel. At Reserve Facilities, the hazardous substances were used or otherwise handled during maintenance and repair of support equipment, vehicles and facilities, and handling and storage of material.

b. The chemical composition, characteristics, and physical state (solid, liquid, or gas) of each such hazardous substance;

Answer. See attached MSDS. Because of the Army's records retention policies, discussed in response to Question 14, records containing this type of information no longer exist. We believe, however, that most of the hazardous substances were in a liquid form, unless otherwise noted above. This conclusion is based (1) the Nike Site reports mentioned in response to Question 1 and (2) interviews of individuals identified in response to Question 2.

c. The annual quantity of each such hazardous substance used, generated, purchases, stored, or otherwise handled;

Answer. Because of the Army's records retention policies, discussed in response to Question 14, records containing this type of information no longer exist. Nonetheless, the Nike Site reports, mentioned in response to Question 1, do provide limited information that is responsive to this question (TAB 5, Table II, TAB 4, Chapter 6).

d. The beginning and end dates of the period(s) during which such hazardous substance was used, generated, purchased, stored, or otherwise handled;

Answer. See previous response.

e. The types and sizes of containers in which these substances were transported and stored; and

Answer. See previous response.

f. The persons or companies that supplied each such hazardous substance to your company.

Answer. See previous response.

5. Identify all by-products and wastes generated, stored, transported, treated, disposed of, released, or otherwise handled by your establishment(s) in the Philadelphia, Pennsylvania area between 1958 and 1976. With respect to each by-product and waste identified, further provide:

Answer. See response to question 4.

a. The process(es) in which each such by-product and waste was generated, stored, transported, treated, disposed of, released, or otherwise handled;

b. The chemical composition, characteristics, and physical state (solid, liquid, or gas) of each such by-product or waste;

c. The annual quantities of each such by-product and waste generated, stored, transported, treated, disposed of, released, or otherwise handled;

d. The types, sizes, and numbers of containers used to treat, store, or dispose of each such by-product or waste;

e. The name of the individual(s) and/or company(ies) that disposed of or treated each such by-product or waste; and

f. The location and method of treatment and/or disposal of each such by-product or waste.

ORIGINAL (Red)

6. Did U.S. Army Reserve ever contract with, or make arrangements with Clearview, Folcroft, Folcroft Annex, Eastern Industrial, Tri-County Hauling, S. Buckley Trash Hauling, Barratt Rupurt, McCloskey Engineering, ABM Disposal Services, Marvin Jonas, Jonas Waste Removal, Paolino Company, Schiavo Bros., Inc., Gene Banta trash Hauling, and/or other company or municipality to remove or transport material from your establishment(s) in the Philadelphia, Pennsylvania area between 1958 and 1976 for disposal? If so, for each transaction identified above, please identify:

Answer.

Information obtained from the EPA indicates that the Army Reserves used Tri-County Hauling and another company, Magnum, in 1974 to remove and transport unidentified material to undisclosed locations. Specifically, the EPA has provided 14 documents to the Army Reserves that it discovered during its investigation into the site. (TAB 8) Nine of these documents appear to be Tri-County Hauling invoices for the removal of unidentified waste from the Reserve Center on Ford Road, Bristol, Pennsylvania between June and November 1974. Another four documents are handwritten notes for the removal of unidentified waste from an Army Reserve site. Only one of the handwritten notes is dated, June 1974. The final document is a printout from an adding machine showing dollar amounts, but no other information. Four of the Tri-County invoices and at least two of the handwritten notes identify another company, Magnum, without providing additional information about that company, its relationship to the Army Reserves, Tri-County Hauling or to the site. The EPA has been unable to provide further information about Magnum. None of the documents provided by the EPA identify where the waste from the Reserve Facility was ultimately disposed of.

The Army's records retention policy in effect during the relevant time frame required the destruction of contract files after 3 years if the value of the contract was less than $2,500 or after 6 years if the value exceeded that amount. Despite that record retention policy, the Army searched[4] a number of active, reserve and national guard facilities for responsive records. Unfortunately, we were unable to locate military records confirming that the Army Reserve contracted or made arrangements with the companies identified above or "Magnum" during the relevant time periods.

Despite the absence of contract records, anecdotal evidence indicates that Army activities occasionally contracted with private companies and/or municipalities to transport and/or dispose of solid waste and hazardous waste. Some of that waste may have been used by municipalities for dust suppression on roads or by private companies for commercial purposes (e.g., undercoating vehicles, recycling) or may have been disposed of at municipal landfills. These observations are based on (1) interviews of Army witnesses identified in response to Question 2; (2) a Management Improvement Program Report for the Third Quarter of 1956 from Fort Dix describing that post's reliance on indefinite quantity contracts with private vendors to sell/dispose of scrap metal and waste oil (TAB 9), (3) the Tri-County Hauling documents discovered by EPA during its investigation into this site (TAB 8), and (4) the Nike Site reports mentioned in response to Question 1 (TAB 5, p. 22; TAB 4, p. 6-4).

Because of the Army's records retention policy, we cannot identify how often Army reserve facilities contracted or made arrangements with private companies and municipalities to transport and/or dispose of wastes or identify the nature of that waste. Nonetheless, we believe the services of private companies and municipalities were used occasionally based on the

[4] These search efforts are described in more detail in response to Question 14.

following factors: (1) the practice of using spent POLs and solvents to control vegetation at reserve sites (TAB 5, p 37) (2) the practice of drumming waste for turn-in through Army supply channels (TAB 4, p 6-5, TAB 5, p 19) (3) the occasional practice of disposing of spent POLs and solvents on-site through sump drains or by pouring it on the ground (TAB 4, p 4-6, 6-5; TAB 5, 19); (4) the use of active duty installations and equipment concentration sites to perform maintenance on reserve vehicles and equipment.

a. The person with whom you made such a contract or arrangement;

Answer. See previous response.

b. The date(s) on which or time period during which such material was removed or transported for disposal;

Answer. See previous response.

c. The nature of such material, including the chemical content, characteristics, and physical state (i.e., liquid, solid, or gas);

Answer. See previous response. The records provided by the EPA indicate that the Army Reserves facility in Bristol, Pennsylvania, used Tri-County Hauling and perhaps a company named Magnum to remove unidentified waste between June and November 1974. Although not specified in those records, Army Reserve personnel believe this waste resulted from construction activities at the Bristol Reserve facility. In 1963, Nike Site PH-15 was closed and deactivated and a 15 acre parcel of land was transferred to the Army Reserves. In 1974, the following Nike Site facilities were demolished: enlisted barracks, officers' quarters, pump house, acid storage shed, acid fueling station, generator building, latrine and missile assembly and test building. Between 1974 and 1975, the new Reserve Center was built. Construction debris from these activities may have included small quantities of copper and/or lead piping, lead based paint, PCBs from generator switchboards, mercury from thermostats and asbestos containing materials (e.g., floor tiles, roofing shingles, pipe insulation).

d. The annual quantity (number of loads, gallons, drums) of such material;

Answer. See previous response.

e. The manner in which such material was containerized for shipment or disposal;

Answer. See previous response.

f. The location to which such material was transported for disposal;

Answer. See previous response.

g. The person(s) who selected the location to which such material was transported for disposal;

Answer. See previous response.

ORIGINAL (Red)

h. The individuals employed with any transporter identified (including truck drivers, dispatchers, managers, etc.) with whom your establishment dealt concerning removal or transportation of such material; and

Answer. See previous response.

i. Any billing information and documents (invoices, trip tickets, manifests, etc.) in your possession regarding arrangements made to remove or transport such material.

Answer. See previous response.

7. Provide the names, titles, areas of responsibility, addresses, and telephone numbers of all persons who, between 1958 and 1976, may have:

Answer. Because of the Army's records retention policies, discussed in response to Question 14, we believe that the documents that would have identified Army Reserve individuals responsible for the activities specified below have been destroyed.

a. Disposed of or treated materials at Clearview, Folcroft and Folcroft Annex or other areas of the Site;

b. Arranged for the disposal or treatment of materials at Clearview, Folcroft, and Folcroft Annex or other areas of the Site; and/or

c. Arranged for the transportation of materials to the Clearview, Folcroft and Folcroft Annex or other areas of the Site, (either directly or through transshipment points) for disposal or treatment.

8. For every instance in which your establishment(s) disposed of or treated material at Clearview, Folcroft and Folcroft Annex or other areas of the Site, or arranged for the disposal or treatment of material at the Site, identify:

Answer. See response to Question 6.c.

a. The date(s) on which such material was disposed of or treated at the Site;

b. The nature of such material, including the chemical content, characteristics, and physical state (i.e., liquid, solid, or gas);

c. The annual quantity (number of loads, gallons, drums) of such material;

d. The specific location on the Site where such material was disposed of or treated; and

e. Any billing information and documents (invoices, trip tickets, manifests, etc.) in your company's or establishment's(s') possession regarding arrangements made to dispose of or treat such material at the Site.

9. Did your establishment(s), or any other company or individual ever spill or cause a release of any chemicals, hazardous substances, and/or hazardous waste, and/or non-hazardous solid waste on any portion of Clearview, Folcroft, and Folcroft Annex or any other portion of the Site? If so, please identify the following:

Answer. The EPA has provided 14 documents indicating that the Army Reserves used Tri-County Hauling and perhaps another company, Magnum, to remove unidentified waste from the Reserve Center on Ford Road, Bristol, Pennsylvania between June and November 1974. The documents provided by the EPA do not identify where the waste from the Reserve Facility was ultimately disposed of. We have been unable to locate any military documents indicating that the Army Reserves spilled or caused a release of any of the identified substances on any portion of Clearview, Folcroft, and Folcroft Annex.

a. The date(s) the spill(s)/release(s) occurred;

b. The composition (i.e., chemical analysis) of the materials which were spilled/released;

c. The response made by you on or your behalf with respect to the spill(s)/release(s); and

d. The packaging, transportation, and final disposition of the materials which were spilled/released.

10. Please identify individuals employed by the U.S. Army Reserve who were responsible for arranging for the removal and disposal of wastes, and individuals who were responsible for payments, payment approvals, and record keeping concerning such waste removal transactions at your Philadelphia, Pennsylvania area establishment(s) between 1958 and 1976. Provide current or last known addresses and telephone numbers where they may be reached. If these individuals are the same person identified by your answer to question 3, so indicate.

Answer. Because of the Army's records retention policy, discussed in response to Question 14, documents that would have identified individuals responsible for the specified activities have been destroyed.

11. Did you or any other person or entity on your behalf ever conduct any environmental assessments or investigations relating to contamination at Clearview, Folcroft and Folcroft Annex or any other areas of the Site? If so, please provide all documents pertaining to such assessments or investigations.

Answer. Before 1984, the Army lacked authority to expend appropriated funds to investigate contamination on property it did not own (i.e., third party sites). The passage of the 1984 Defense Appropriation Act remedied this problem and gave the Army authority to investigate formerly used defense sites (FUDS) (i.e., Nike Sites). In addition to the FUDS program, the Army also gained authority under the Defense Environmental Restoration Program to use current year funds to conduct environmental assessments and/or site investigations at third party sites where it has been identified as a potentially responsible party. (TAB 5, p 4) During our investigation, we found no evidence that the Lower Darby Creek Area Superfund site qualifies as a FUDS or that the Army or any of its contractors conducted an environmental assessment or site investigation at Clearview, Folcroft or Folcroft Annex.

12. If you have any information about other parties who may have information which may assist the EPA in its investigation of the Site, including Clearview, Folcroft and Folcroft Annex, or who may be responsible for the generation of, transportation to, or release of contamination at the Site, please provide such information. The information you provide in response to this request should include the party's name, address telephone number, type of business, and the reasons why you believe the party may have contributed to the contamination at the Site or may have information regarding the Site.

Answer. We are not aware of other parties who have information regarding these sites at this time.

13. Representatives of your establishment(s):

a. Identify the person(s) answering these questions on behalf of you establishment(s), including full name, mailing address, business telephone number, and relationship to the company.

Answer. Listed below are names of current or former Army personnel who provided information responding to the questions or who drafted the responses to these questions.

U.S. Army Reserves

1. LTC Donald Taylor, Deputy Staff Judge Advocate, 99th Reserve Support Command, ATTN: AFRC-CPA-JA, 99 Soldier's Lane, Coriapolis, PA 15108-2550. (412) 604-8255. Donald.Taylor2@usarc-emh2.army.mil

2. Bruce Kish, Environmental Protection Specialist, 99th Reserve Support Command, ATTN: AFRC-CPA-EN-E, 99 Soldier's Lane, Coriapolis, PA 15108-2550 (412) 604-8169. Bruce.Kish@usarc-emh2.army.mil

3. Kendra L. Borka, Environmental Protection Specialist, GS-0028-11, 99th Regional Support Command, Region Office 2, Bldg. 176, NAS Willow Grove, PA 19090. (215) 443-1643/1667 kendra.borka@usarc-emh2.army.mil

4. Walter S. Wisner, Retired, Facility Management Supervisor [redacted]n, [redacted]

5. Francis E. Huff, AMSA#23 Supervisor, AMSA#23, BLDG. 178, NAS Willow Grove, PA 19090 (215) 443-1654 Huffe@usarc-emh2.arm.mil

6. Raymond Bevan, ECS Supervisor, ECS #24, Bldg. 10-83, Fort Indiantown Gap, Annville, PA 17003-5015 (717) 861-2165 Raymond.Bevan@usarc-emh2.army.mil

7. Thomas Lynch, SSA ,338th Medical Group, James W. Reese USARC, 500 W. 24th Street (Upland), Chester, PA 19013-4999 (610) 872-0311 Thomas.Lynch@usarc-emh2.army.mil

8. Nicholas M. Taylor, Facility Management Specialist, North Penn Memorial USARC, 1625 Berks Road, Norristown, PA 19403-4815 1-800-419-5824 ext. 225 nicholas.taylor@usarc-emh2.army.mil

9. Bruce Noble, DRMS Achieves Manager, Defense Reutilization and Marketing Service, 74 N. Washington Ave, Battle Creek, MI 49017-3092 (616) 961-7412 Bnoble@drms.dla.mil

10. Robert Panbianco, DRMO Lakehurst, Naval Air Engineering Bldg. 75, Lawerence & Severyns Road, Lakehurst, NJ 08733-5010 (732) 2023/7373

11. Stanley D. Bauer, SME NIKE Sites, US Army Corps of Engineers, HTRW Center of Expertise, CENWO-HX-S9 Stan Bauer), 12565 West Center Road, Omaha, NE 68144-3869 (402) 697-2619 stanley.d.bauer@usace.army.mil

12. Michael Ney, PA Department of Military & Veterans Affairs, Fort Indiantown Gap, Annville, PA 17003-5002 (717) 861-9672

13. Ken Malick, Dunham Army Clinic, ATTN: Environmental Health, Carlisle Barracks, PA 17013-5003 (717) 245-3902

14. William Staub, CXO, 99th Regional Support Command, 99 Soldier Lane. Moon Township. PA 15108 (412) 604--8002 william.staub@usarc-emh2.armt.mil

15. Cal Bowser, DCSLOG, 99th Regional Support Command, 99 Soldier Lane, Moon Township, PA 15108 (412) 604-8377 Cal. Bowser@usarc-emh2.army.mil

16. Bonaparte Miller, Retired Former Supervisor, AMSA#31, [redacted]

Corps of Engineers.

17. Robert J. Williams, ATTN: CENAB-PP-E, Baltimore District, Corps of Engineers, P.O. Box 1715, Baltimore, MD 21203. (410) 962-4006. (Point of Contact for Formerly Used Defense Sites in Pennsylvania)

18. Gregory Goepfert, ATTN: CENAN-PP-E, New York District, Corps of Engineers, Jacob K. Javits Federal Building, New York, NY 10278 (212)264-5581. (Point of Contact for Formerly Used Defense Sites in New Jersey).

b. Provide the name, title, current address, and telephone number of the individual representing your establishment(s) to whom future correspondence or telephone calls should be directed.

Answer. Correspondence and calls regarding this questionnaire should be directed to the following addressee:

COL Del Fougner, Chief Engineer, Office of the Chief Army Reserves, DAAR-EN, 1421 Jefferson Davis Highway, Suite 11200, Arlington, VA 22202 (703) 601-3405. Del.Fougner@ocar.army.pentagon.mil

LTC David Harney, Environmental Attorney, Environmental Law Division, U.S. Army Legal Services Agency, 901 North Stuart Street, Suite 400, Arlington, VA 22203 (703) 696-1596. harneydp@hqda.army.mil.

14. If any of the documents solicited in this information request are no longer available, please indicate the reason why they are no longer available. If the records were destroyed, provide us with the following:

a. Your document retention policy.

Answer.

a. **Document Retention Policy**. As noted in response to Question 1, the Army established an area support program under which designated installations provided services necessary to support military units and activities in specified geographic regions. Under that program, Fort Indiantown Gap and Fort Dix provided a variety of logistics services to Pennsylvania and New Jersey reserve units, respectively. As a result, these installations were required to create, maintain and dispose of records associated with those particular support activities under the Army's records management policy, "The Army's Functional Files System (TAFFS)"(TAB 10, paragraph 1.b; TAB 11, paragraph 1.b; TAB 12).[5] The Army also established a records management policy, the "Unit Functional Files System", for all Reserve units and activities as well. (TAB 13, paragraphs 2.b & c)[6] The Unit Functional Files System (UFFS) complemented the TAFFS, but imposed streamlined records management obligations on units using that system. (TAB 13).[7] Both records managements systems maintained records according to major functional areas.

b. Prior to August 1969, the only records archived under TAFFS[8] and UFFS[9] were those with a retention period longer than 6 years or otherwise identified as a "permanent" record. In August 1969, the Army adopted new disposition standards for TAFFS by rescinding AR 345-210 with the 340-18 series of regulations (TABs 10 & 11) which only archived records identified as "permanent". When new disposition standards reduced the retention period for records, Army commands were required to apply those new standards retroactively unless it was impractical or uneconomical to do so. (TAB 12, para. 53.b).

c. Summarized below are the major functional areas, subcategories and disposition instructions for records which may have contained relevant information. Records in the Individual Procurement Transaction Files (Category 1403), the Supplies Disposition Files (Category 1434), Real Property General Maintenance Files (Category 1508), and Environmental Pollution Files beginning in September 1974, are the most relevant to this request for information because they tend to show how the Army Reserves disposed of waste material. The remaining categories are relevant because they tend to depict waste generating activities.

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[5] TAB 10 (AR 340-18-14, *Maintenance and Disposition of Logistics Functional Files*, 14 Aug 1969); TAB 11 (AR 340-18-15, Maintenance and Disposition of Facilities Functional Files, 14 Aug 1969). Before August 1969, the Army records management policy for most units and activities was consolidated in AR 345-210, *Records Management File Systems and Standards*, 31 Oct 1962 (TAB 12).

[6] TAB 13 (AR 345-215, *Records Management – TOE Units of the Active Army and the Army Reserve*, 1 Nov 1962, paragraph 2.b & c.

[7] TAB 13. AR 345-215, paragraphs 1 ("These regulations are designed to simplify the administration of records in certain" units.); 5.b (noting that the Unit Functional Files System simplifies the TAFF "because units governed by these regulations normally do not create files in these functional areas.").

[8] TAB 12 (AR 345-210, para 57f(2)).

[9] TAB 13 (AR 345-215, para 29(1) – (8)).

ORIGINAL (Red)

AR 340-18-14, Maintenance and Disposition of Logistics Functional Files, 14 August 1969. (Applicable to Department of the Army, except Army Reserve elements.)(TAB 10)

1403 Individual Procurement Transaction Files		
File No.	**Description**	**Disposition**
1403-01	Transactions for $2,500 or less.	Destroy after 3 years.
1403-03	Transactions for more than $2,500.	Destroy 6 years after final payment.
1403-05	Master, open-end and call-type contract files.	Offices administering contract: Destroy 6 years after expiration and final payment. Offices procuring under contract: dispose based on values established above.
1420 Maintenance Files		
File No.	**Description**	**Disposition**
1420-17	Preventive maintenance schedule files.	Destroy after transferring the required information to other records or on disposition of related equipment, whichever occurs first.
1420-18	Equipment inspection and maintenance worksheet files.	Destroy on posting to related equipment log book, on entering deficiencies on a new form or on completion of next serviceability test.
1431 Petroleum and Solid Fuel Supply Files		
File No.	**Description**	**Disposition**
1431-02	Gasoline and lubricant issue files.	Destroy after 1 year
1431-04	Solid fuel control files	Creating Offices: File in and dispose with the appropriate related procurement file.
1434 Supplies Disposition Files		
File No.	**Description**	**Disposition**
1434-06	Sales contract files.	Destroy 3 years after close of FY in which final payment is made.
1434-08	Retail sale files.	Same.

AR 340-18-15, Maintenance and Disposition of Facilities Functional Files, 14 August 1969. (Applicable to Department of the Army, except Army Reserve elements.)(TAB 11)

1508 Real Property General Maintenance Files		
File No.	**Description**	**Disposition**
1508-06	Sanitary service files.	Other offices: Destroy when superseded, obsolete, or no longer required for reference whichever is first.
1508-07	Custodial service files.	Same.
1512 Water and Air Pollution Files (effective 14 August 1969)[10]		
Does not Contain File Categories Relevant to Solid/Hazardous Waste		
1512 Environmental Pollution Files (effective 12 September 1974)		
1512-01	Environmental pollution abatement files.	Other offices: Destroy when superseded, obsolete, or no longer required for reference whichever is first.
1512-02	Environmental pollution complaint files.	Destroy 10 years after close of case.

[10] Research indicates the Army did not begin maintaining environmental records until October 1966 when the Army amended AR 345-210 and incorporated functional categories 1503-31.1 – 1503-31.4 which addressed air and water pollution complaint and abatement records. Like the 1969 versions, these earlier categories did not contain information relevant to the management of solid or hazardous waste. (TAB 12).

AR 345-215, Records Management TOE Units of Active Army and Army Reserve, 1 Nov 1962 (Applicable to all Army Reserve units and activities)(TAB 12)

15 Supply Files		
File No.	**Description**	**Disposition**
14-28	Gasoline and lubricants issue	Destroy after 1 Year.
14-36	Equipment inspection and maintenance work sheet files	On posting of related equipment log book, or on entering deficiencies of a new form as applicable.
14-43	Lubrication record files	1 year after final entry on the form.

d. **Document Searches**. Despite the record retention policies described above, Reserve and National Guard personnel in Pennsylvania and New Jersey searched for records that were responsive to this request for information. Those efforts included searching for records at Fort Indiantown Gap, Fort Dix, the Defense Reutilization Marketing Service archives, and at the eight active reserve facilities that were also active when the Lower Darby Creek Area landfills were operational. To date, those searches have not turned up any responsive records. In addition, the Army's Environmental Law Division, which represents the Army in environmental litigation and administrative proceedings, has conducted similar record searches in association with the Combe Fill South Landfill Site, a municipal landfill that operated in Chester, New Jersey, from 1940 to 1983. Searches for records (showing that the Army and/or Army Reserves units shipped waste to the Combe site) at Fort Dix, New Jersey, the 79th Army Reserve Command (ARCOM), Willow Grove, Pennsylvania, (a predecessor to the 99th Reserve Support Command), and at the Suitland and St. Louis Federal Records Centers were unsuccessful.

e. As a final quality control measure, we are coordinating with the Corps of Engineers in New York and the 77th Regional Support Command (and its predecessor the 77th ARCOM, Fort Totten, Flushing, NJ), to determine whether any of those locations has any relevant information. We have also have begun reviewing consolidated index reports from the federal records center at Suitland, Maryland and St. Louis, Missouri. When those document search efforts are complete, we will provide those responses to your office.

b. A description of how the records were/are destroyed (burned, archived, trashed, etc.) and the approximate date of destruction.

Answer. Records authorized for destruction under TAFFS and UFFS were destroyed or sold as waste paper provided the content of those records was destroyed beforehand. TAB 12, para. 55.b)

c. A description of information that would have been contained in the documents; and

Answer. See the general description of the records in TABs 10 – 13.

d. The name, job title, and most current address known to you of the person(s) who would have produced these documents; the person(s) who would have been responsible for the retention of these documents; and the person(s) who would have been responsible for the destruction of these documents.

Answer. Because of the records retention policy described above, documents containing this information is no longer available.

APPENDIX 1
FACILITY LIST

TABLE 1: USAR and Nike Facilities Active from 1958 to 1976.

FACILITY	COUNTY	STATUS	CURRENT UNITS/ACTIVITES	PAST (1958-1976) UNITS/ACTIVITIES
Bristol USARC 2501 Ford Rd. Bristol, PA	Bucks	Active	**Units**: 365th Military Intelligence Co, 413th Postal Detachment (Det); 465th Transportation Co - deployed to Fort Bragg, NC for 2 yrs. **Activity**: Administrative[11]; OMS[12].	• Jul 1954-Feb 60: Army acquired 23 acres from private landowners. • 1956-1963: Active Nike Site (#PH-15). • Nov 1963: 15 acre launch parcel reassigned to USAR which builds USARC on that parcel circa 1974-75. Old Nike buildings demolished. • Jun 1964: 8 acre control parcel reassigned to USAR for administrative purposes. Vacated and reported excess to GSA in Jul 1976. • 1980s-1990s: Co A, 1-315th Infantry Reg't; 3-42nd Field Artillery (FA) Bn; HQ, HQ Battery, 3-42nd FA.
Edgemont USARC/AMSA 2101 Delchester Rd. Edgemont, PA	Delaware	Active	**Units**: 424th Medical Battalion **Activities**: Administrative, OMS; AMSA[13].	• 1954-60: Army acquired 108 acres from private landowners. • 1954-69: Active Nike Site (#PH-75/78 (Media)) (1955-1968) Huntsville. • Mar 1964: GSA conveys 3 acres to landowner. • Dec 1969: 105 acres reassigned to USAR. • Jun 1970-Feb 77: USAR declares 65 acres excess & retains 43 acres for USARC. • 1973-78: GSA transfers 65 acres to private and municipal landowners. • 1980s-early 1990s: 157th Spt Bn (HHD, Co B, Co C, Co D); 223rd Trans Co.

[11] Administrative functions include routine office support functions.
[12] OMS is an abbreviation for "Organizational Maintenance Site." An OMS is a two-bay work shop located at some Reserve facilities that is used by units for minor maintenance and repairs of administrative vehicles and equipment.
[13] AMSA is an abbreviation for "Area Maintenance Support Activity." AMSAs are larger maintenance shops consisting of three or more workbays and staffs of 20 or more personnel. AMSAs were created in the 1970s to replace Area Organizational Maintenance Sites. AMSAs service specific regions within a Reserve command and may provide specialized maintenance (e.g. watercraft maintenance). AMSAs performed a greater degree of maintenance such as engine repair and may operate "sub shops" at certain Reserve facilities which perform minor maintenance checks and services.

FACILITY	COUNTY	STATUS	CURRENT UNITS/ACTIVITES	PAST (1958-1976) UNITS/ACTIVITIES
Germantown USARC 5200 Wissahickon Ave Philadelphia, PA	Philadelphia	Active	**Unit:** 233rd Quartermaster Co; Recruiting Station **Activities:** Admin; OMS	1940-55: Army acquired land from Philadelphia. 1955-56: USAR Center built. Early 1990s: Co. B, 1-315th Inf; Co C, 1-315th Inf.
Horsham 01 USARC 936 Easton Rd Horsham, PA	Montgomery	Active	**Units:** 367 MP Co, HHC, 244th AVN Bn; AMSA #23 subshop. **Activities:** Admin., Maintenance	Jul 1953: Army acquired land from Lippincott heirs. 157th Inf Bde; Co A, 157th Spt Bn; 390th CM Det
James Reese USARC 500 W 24th St. Chester, PA	Delaware	Active	**Units:** 338th Medical Group, 858th Med. Det. (Dental), 817th Replacement Battalion (Personnel) **Activity:** Administrative; OMS.	• Aug 1957: Army acquired land from Wildman/ Coopersmith. • 1957-58: USARC built. • 1980s-1990s: 817th P&A Bn; 324th Med Co; 402nd Med Det; 458th Den Det; 456th Den Det
Marcus Hook USARC 7 West Delaware Ave Marcus Hook, PA	Delaware	Inactive	NOT APPLICABLE	1956-1973: USPHS Quarantine Station 1973-1999: USAR 949th Trans Co (Watercraft). 2001 Transferred to Marcus Hook
Mussleman USARC 1020 Sandy Hill Norristown, PA	Montgomery	Active	**Units:** 358th Civil Affairs Brigade: 416th Civil Affairs Bn. 401st QM Bn (Petro Prod) **Activities:** Administrative; OMS	• Sep 1955: Army acquired land from Steinbach. • 1955-56: USAR Center built. • 401st QM Bn (Petro Prod); 127th Mob Des Det (R & D)
North Penn USARC 1625 Berks Rd. Norristown, PA	Montgomery	Active	**Units:** 307th Band, 153rd Legal Spt. Organization; 369th Fire Fighter Det., 223rd Truck Co (POL) **Activities:** Administrative, OMS	• 1954-55, 60: Army acquired 31 acres from private business. • 1954-68: Former Nike Site (#PH 91) (1956-63). • Jul 1968: Reassigned to USAR. • Apr 1973: USAR reports 12 acres excess. • 1975: GSA transfers 12 acres to municipalities.
Philadelphia AFRC 2828 Woodhaven Rd. Philadelphia, PA	Delaware	Active	**Units:** Joint Facility shared with U.S. Marine Corps and Army Civil Affairs Brigade. **Activity:** Admin., Maintenance	• Apr 1963: Army acquired land from Philadelphia. • 1963-64: USAR Center built. • 304th CA Gp; 224th MI Co; 122nd Mob Des Det; 2072nd USARF School; Co C, 330th EN Bn; Det 1, 442nd Fld Svc Co (Laundry)
Nike Site PH 07 Richboro/Northampton Township, PA	Bucks	Inactive	NOT APPLICABLE	• Jun 1954-Dec 58: Army acquired land. • 1956-61: Active Nike Site. (1954-68 Huntsville) • Aug 1964: All land reported excess to GSA • Jun 1967-Jun 68: GSA transfers land to private & municipal owners & retains control of 54 acre perpetual easement.

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Response to Section 1[illegible], CERCLA, Questionnaire
Lower Darby Creek Superfund Site

FACILITY	COUNTY	STATUS	CURRENT UNITS/ACTIVITES	PAST (1958-1976) UNITS/ACTIVITIES
Nike Site PH 67 Chester, PA	Bucks	Inactive	NOT APPLICABLE	• 1954 & 59: Army acquired land. • 1954-64: Active Nike Site. (1955-63 Huntsville). • Dec 1964: Reported excess to GSA. • Nov 1965: Conveyed to school district.
Nike Site PH 82 Schuylkill Haven, PA	Schuylkill	Inactive	NOT APPLICABLE	• 1955-70's: Active Nike Site. • Transferred to University of PA, Valley Forge Research Center.
Nike Site PH 97/99 Lansdale/Warrington PA	Bucks	Inactive	NOT APPLICABLE	• 1954-60: Army acquired 40 acres • 1954-70: Active Nike Site (1956-1971). • Jan 1970: 25 acres reassigned to USAR. • Aug 1977: entire parcel declared excess. • Dec 1978: GSA transfers parcel to municipality.
Nike Site PH 25 Newbolds Corner Road Eayrestown Road Lumberton, NJ		Inactive	NOT APPLICABLE	• Mid-1950s: Army acquired 36+ acres in fee simple and 75+ acres in easements. • 1958-62: Active Nike Site. • Dec 1963: 4+ acres sold to private individual. • Oct 1974: Balance reported excess to GSA. • Apr/May 1976: fee acreage conveyed to Lumberton.
Nike Site PH 41/43 Williamstown Road Cross Keys Road Gloucester Township New Jersey	Berlin	Inactive	NOT APPLICABLE	• Mid-1950s: Army acquired 138 acres. • 1956-1974: Active Nike Site. • Post 1974: Land Reported excess to GSA and maintained by GSA as of 18 June 2001.
Nike Site PH 58 Route 322 Swedesboro, NJ	Gloucester	Inactive	NOT APPLICABLE	• May 1955-Nov 1959: Army acquired 35+ acres in fee simple and 36 acres in easements. • 1957-1966: Active Nike Site. • Sep 1974: fee acres and 3+ acres easements reported excess to GSA. • Aug 1976: GSA transfers above parcels to Swedesboro-Woolwich Board of Education • Jul 1979: GSA assumes care for balance of easement acres. • Jun 1983: transferred parcels revert back to GSA.

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TABLE 2: USAR or Nike Facilities currently active in Philadelphia, Pennsylvania Area.

FACILITY	COUNTY	STATUS	CURRENT UNITS/ACTIVITES	PAST (1958-1976) UNITS/ACTIVITIES
MG Wurts Bldg 176 NAS Willow Grove, PA	Montgomery	Active	**Units:** 656th Area Support Group 1215th Garrison Support Unit **Activity:** Admin	NOT APPLICABLE USAR Center constructed 1977
AMSA #23 Bldg 178 NAS[14] Willow Grove, PA	Montgomery	Active	**Units:** AMSA #23. **Activity:** AMSA	NOT APPLICABLE USAR Facility constructed 1977
Air Staging Facility #28 Bldg 177 NAS Willow Grove, PA	Montgomery	Active	**Units:** HQs, 79th ARCOM; Aviation Brigade, 79th ARCOM **Activity:** Administrative, aviation maintenance	NOT APPLICABLE USAR Facility constructed 1977

TABLE 3: Inactive USAR and Nike Facilities in Philadelphia, Pennsylvania area.

Downingtown USARC Boot Road Downingown, PA	Chester	Inactive	**Unit:** None. **Activity:** NOT APPLICABLE. Property used late 1980s-1992/4.	NOT APPLICABLE
Folsom AFRC[15] 6th Kenron Ave Folsom, PA	Delaware	Inactive	**Units:** None. **Activity:** NOT APPLICABLE. USAR used facility from 1980s to 1995.	NOT APPLICABLE
Horsham 02 USARC 400 Horsham Road Horsham, PA	Montgomery	Inactive	**Units:** None. **Activity:** NOT APPLICABLE. Property used from late 1980s-1996.	NOT APPLICABLE
Horsham USARC 420 Babylon Rd. Horsham, PA	Montgomery	Inactive	**Units:** None. **Activity:** NOT APPLICABLE. Property used for administrative purposes early 1990s-1996.	NOT APPLICABLE
N.E. Phila. USARC 1522 East Wingohocking St Phila, PA	Philadelphia	Inactive	**Units:** None. **Activities:** NOT APPLICABLE. Property used for administrative purposes 1980s-1990s.	NOT APPLICABLE

[14] NAS is an abbreviation for Naval Air Station.
[15] AFRC is an abbreviation for Armed Forces Reserve Center. Although the Army Reserve has vacated the Folsom AFRC, that facility is still used by other branches of the Armed Forces (e.g., Naval Reserves).

Quakertown USARC Route 663 Quakertown, PA	Bucks	Inactive	**Units:** None **Activity:** NOT APPLICABLE. Property used for administrative purposes 1980s-1990s.	NOT APPLICABLE
Tacony Warehouse 5100 Princeton Ave Philadelphia, PA	Philadelphia	Inactive	**Units:** None. **Activity:** NOT APPLICABLE. Property used for equipment storage 1980s-1990s.	NOT APPLICABLE
Willow Grove USARC Woodlawn Ave Willow Grove, PA	Montgomery	Inactive	**Units:** None. **Activity:** NOT APPLICABLE. Property used for administrative purposes 1980s-1995.	NOT APPLICABLE

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4

ORIGINAL (Red)

SUMMARY

Nike Ajax missiles were first deployed in 1954, and remained in use until 1964. The Ajax was a two-stage missile using a solid-fueled booster and a liquid-fueled sustainer motor to deliver high explosive warheads to a radar-determined intercept point with target aircraft.

Nike Hercules missiles were introduced in 1958, and gradually replaced the Ajax. Some Hercules missiles remained in use until the mid-1970s. Hercules was a two-stage missile which differed from Ajax in that the sustainer motor was solid-fueled, and the warheads were primarily nuclear.

The typical Nike battery consisted of two main operating areas and sometimes included a third area for housing. The battery control area contained the electronic equipment for target tracking, missile guidance, and fire control. Support facilities such as an electric generator building and motor pool were also included in some instances. The launch area contained the facilities and equipment required to assemble, test, and maintain the missiles and associated launchers. Motor pools, generator buildings, guard dog kennels, and other support facilities were also generally included in this area.

General operational procedures used at Nike sites were found to be consistent, although specifics of material handling and disposal varied considerably for individual batteries. The most common liquids disposed of onsite were solvents used in maintenance operations. These were routinely dumped into sumps where they soaked into the ground. Fuel components were also sometimes disposed of in this manner, but to a more limited extent. Only isolated incidents of containerized disposal were reported.

ORIGINAL (Red)

TABLE OF CONTENTS

Section		Page
	SUMMARY	i
1.0	INTRODUCTION	1-1
2.0	HISTORY OF THE NIKE PROGRAM	2-1
	2.1 AJAX	2-1
	2.2 HERCULES	2-2
	2.3 ZEUS	2-4
3.0	MILITARY ORGANIZATION OF THE NIKE MISSILE SYSTEM	3-1
	3.1 NATIONAL AIR DEFENSE ORGANIZATION	3-1
	3.2 NIKE SYSTEM ORGANIZATION	3-1
	3.3 NIKE BATTALION ORGANIZATION	3-2
4.0	DESCRIPTION OF BATTERIES	4-1
	4.1 LAND USE	4-1
	4.2 FUNCTIONS AND FACILITIES OF MAJOR AREAS	4-1
	4.3 OUTSIDE SUPPORT REQUIREMENTS	4-5
5.0	DESCRIPTION OF THE NIKE MISSILES AND EQUIPMENT	5-1
	5.1 AJAX	5-1
	5.1.1 CONSTRUCTION	5-1
	5.1.2 PROPELLANTS	5-5
	5.1.3 WARHEADS	5-5
	5.1.4 SUPPORT EQUIPMENT	5-5
	5.2 HERCULES	5-9
	5.2.1 CONSTRUCTION	5-9
	5.2.2 PROPELLANTS	5-12
	5.2.3 WARHEADS	5-12
	5.2.4 SUPPORT EQUIPMENT	5-12
	5.3 ZEUS	5-14
6.0	LIFE CYCLE OF TYPICAL NIKE BATTERY	6-1
	6.1 AJAX	6-1
	6.1.1 DEPLOYMENT	6-1
	6.1.2 OPERATION	6-3
	6.1.3 CONVERSION/DEACTIVATION	6-6

ORIGINAL (Red)

TABLE OF CONTENTS
(Continued, Page 2 of 2)

	6.2	HERCULES	6-8
		6.2.1 DEPLOYMENT	6-8
		6.2.2 OPERATION	6-8
		6.2.3 CONVERSION/DEACTIVATION	6-9
7.0	ENVIRONMENTAL RELEASES		7-1
	7.1	CHLORINATED ORGANIC SOLVENTS	7-1
	7.2	HYDROCARBONS	7-4
	7.3	IRFNA	7-6
	7.4	UDMH	7-7
	7.5	ANILINE - FURFURYL ALCOHOL	7-7
	7.6	BATTERY ELECTROLYTE	7-8
	7.7	RADIOACTIVE MATERIALS	7-8
	7.8	RESIDUAL CONTAMINATION	7-8
8.0	CONCLUSIONS		8-1
9.0	REFERENCES		9-1

APPENDICES

APPENDIX A--ADDITIONAL SOURCES CONSULTED	A-1
APPENDIX B--LOCATIONS OF FORMER NIKE MISSILE SITES	B-1
APPENDIX C--GEOGRAPHIC AREAS OF RESPONSIBILITY FOR ARAACOM, ARADCOM, AND NORAD FOR THE PERIOD 1950 TO 1973	C-1
APPENDIX D--EXAMPLE NIKE SITE MAPS	D-1

ORIGINAL (Red)

LIST OF TABLES

Table		Page
5.1-1	General Construction and Performance Data for the Nike Ajax	5-2
5.2-1	General Construction and Performance Data for the Nike Hercules	5-11
5.2-2	Support Equipment Characteristic of the Nike Hercules Battery	5-13
7.0-1	Summary of Environmental Releases at a Nike Missile Battery	7-2
7.1-1	Physical and Transport Data for Chlorinated Organic Solvents	7-3
7.1-2	Current EPA Water Quality Standards/Criteria for Selected Contaminants	7-5

ORIGINAL (Red)

LIST OF FIGURES

Figure		Page
3.3-1	Organization of a Typical Nike Battalion	3-3
4.1-1	Launch Control Area Map, Phoenix Military Reservation (BA-03), Jacksonville, Md.	4-2
4.1-2	Battery Control Area Map, Phoenix Military Reservation (BA-03), Jacksonville, Md.	4-3
5.1-1	Basic Configuration of the Nike Ajax Missile	5-3
5.1-2	Tracking-Intercept Process of the Nike Ajax Missile	5-4
5.1-3	Nike Ajax Warhead Positions and Construction	5-6
5.2-1	Basic Configuration of the Nike Hercules	5-10
5.3-1	Basic Configuration of the Nike Zeus Missile	5-15

ORIGINAL (Red)

LIST OF ACRONYMS AND ABBREVIATIONS

AAA	antiaircraft artillery
ABMA	U.S. Army Ballistic Missile Agency
ACQR	acquisition radar
ADSIMO	Air Defense Special Items Management Office
AMC	U.S. Army Materiel Command
AOMC	U.S. Army Ordnance Missile Command
ARAACOM	U.S. Army Antiaircraft Command
ARADCOM	U.S. Army Air Defense Command
ARGMA	U.S. Army Rocket and Guided Missile Agency
ATBM	antitactical ballistic missile
$atm \cdot m^3\ mole^{-1}$	atmosphere cubic meters per mole
BCA	battery control area
BN	battalion
BTRY	battery
^oC	degrees Celsius
cm	centimeters
COE	U.S. Army Corps of Engineers
CONAD	Continental Air Defense Command
CONUS	continental United States
DARCOM	U.S. Army Materiel Development and Readiness Command
EPA	U.S. Environmental Protection Agency
FTBL	Headquarters, U.S. Army Air Defense Center and Fort Bliss
gal	gallons
ha	hectares
HQ	headquarters
hr^{-1}	per hour
ICBM	intercontinental ballistic missile
IRFNA	inhibited red fuming nitric acid
kg	kilograms
km	kilometers
K_{oc}	sediment-water partition constant

K_{ow}	octanol-water partition constant
kph	kilometers per hour
kW	kilowatts
l	liters
LA	launch area
m	meters
m^3	cubic meters
mg/l	milligrams per liter
MICOM	U.S. Army Missile Command
$l\ cell^{-1}\ hr^{-1}$	milliliter per cell hour
$mole^{-1}\ hr^{-1}$	per mole hour
MTR	missile tracking radar
NAMSA	NATO Maintenance and Supply Agency
NATO	North Atlantic Treaty Organization
NIPDWR	National Interim Primary Drinking Water Regulations
NORAD	North American Air Defense Command
OCO	Office of Chief of Ordnance
PCBs	polychlorinated biphenyls
POL	petroleum, oils, and lubricants
R&D	research and development
torr	millimeters of mercury
TTR	target tracking radar
UDMH	unsymmetrical dimethyl hydrazine
ug/l	micrograms per liter
USAEHA	U.S. Army Environmental Hygiene Agency
USAF	U.S. Air Force
USATHAMA	U.S. Army Toxic and Hazardous Materials Agency
USN	U.S. Navy
WWII	World War II

ORIGINAL (Red)

1.0 INTRODUCTION

Between 1954 and the early 1970s, Nike Ajax and Nike Hercules missiles were deployed by the U.S. Army throughout the continental United States (CONUS) to protect major metropolitan areas and strategic military installations from aerial attack. Maintenance of the missile batteries in a combat-ready posture required the storage, handling, and disposal not only of missile components and propellants but also of solvents, fluids, fuels, and other materials required for a variety of support functions. The purpose of this report is to describe the Nike missile system and associated activities as they pertain to environmental concerns.

Information presented in this report was obtained from unclassified documents and from interviews with Army personnel who were assigned to Nike units (App. A). The documents included technical reports, unit histories, and field manuals. Published sources, however, presented an incomplete understanding of disposal practices and other topics of interest. Much of the information provided herein was obtained through extensive interviews with approximately 30 persons currently assigned to units at the U.S. Army Air Defense Center and Fort Bliss, Tex. (FTBL). Other agencies were also consulted (see App. A). The interviewees' experience with the Nike system spanned the entire period of missile deployment and included virtually every Nike site in CONUS. These persons were familiar with activation, deactivation, and conversion from Ajax to Hercules systems as well as with routine operations.

Detailed information is provided regarding the history, military organization, and physical components of the Ajax and Hercules systems. Development and testing of Nike Zeus is discussed briefly, as this system was never operationally deployed. Such information is intended to allow the report to be utilized as a "stand-alone" reference and to form the basis for certain inferred conclusions concerning environmental impacts of the system.

2.0 HISTORY OF THE NIKE PROGRAM

2.1 AJAX

Shortly after the end of World War II (WWII), the Army recognized the need for an air defense system capable of engaging high speed, maneuverable targets at far greater ranges than the conventional artillery available at the time. Development studies on such a system were begun as early as 1945. These studies led to establishment of a formal research and development (R&D) program for the system later to become known as Nike Ajax. After the Korean Conflict began in 1950, pressure to make the system operational mounted, and in late 1951, the Nike program was accelerated. The development and production processes were overlapped in order to advance the system to the tactical weapon stage as soon as possible. The program was originally called Nike I until November 1956, when it was renamed Nike Ajax.

Contractor evaluation tests of the tactical prototype Nike Ajax system began in January 1953 and continued through May of that year. The first prototype model battery was delivered to White Sands Proving Ground, on May 15, 1953. Service evaluation tests by tactical Army troops began in October 1953.

Major test locations for the Nike Ajax system were Redstone Arsenal, Ala.; FTBL; and the adjacent White Sands Missile Range, then known as White Sands Proving Ground. The system performed well in testing, and no major design changes were made once service evaluation testing began.

Conversion of the United States air defense system from artillery to guided missiles began in March 1954, when the first combat-ready Nike Ajax battalion was deployed at Fort Meade, Md., in what was then known as the Washington-Baltimore Defense Area. Conventional antiaircraft gun units were outnumbered by Nike Ajax units by December 1956, and the conversion to guided missiles was completed by mid-1958.

The development of Nike Ajax missiles began with the designated defense areas around major cities on the United States east coast. These included Boston, Providence, Philadelphia-New York, and Baltimore-Washington. West coast sites were added soon after near Seattle, San Francisco, and Los

ORIGINAL (Red)

Angeles. Before deployment was complete, additional sites were added at major military bases and other cities in the southeast and midwest including Miami, Cleveland, Milwaukee, and Detroit. App. B shows the dates of deployment and location of CONUS Nike sites.

During its term of service in the field, the Nike Ajax system remained essentially unchanged. The second generation Nike system, originally called Nike B and later named Nike Hercules, was under development even while Nike Ajax was still being deployed. Thus, all the Ajax batteries were essentially the same in design and construction, and no effort was made to update the Nike Ajax batteries once they were deployed. In-field changes were limited to minor equipment modifications to improve operational efficiency. Beginning in late 1958, selected Ajax batteries were converted to the Hercules system. This process is described in Sec. 6.0.

The Ajax/Hercules conversions which took place between 1958 and 1961 followed essentially the same pattern as the original Ajax deployment, beginning with major east coast metropolitan defense areas and spreading to the west and midwest.

Final phase out of Ajax batteries which were not converted to the Hercules system began in early 1962. This process took 2 years and was completed in early 1964, when the last CONUS Nike Ajax battery was deactivated. Six non-tactical Ajax systems were retained at FTBL (Cagle, 1959; 1973).

2.2 HERCULES

Even before deployment of the Nike Ajax, it was realized that the weapon system had performance limitations which would prevent it from engaging formations of high speed, high altitude aircraft which would soon be in use. Most critical was the limited resolution of the Ajax target tracking radar, which tended to wander between planes in a formation, resulting in the missile passing between two aircraft and detonating without causing any damage to the attackers. In 1952, the Ordnance Corps began feasibility studies of an improved air defense system which would be capable of countering anticipated aerial threats and could be modified to keep pace with advances in attack systems.

ORIGINAL (Red)

Preliminary design studies of the Nike Hercules system began in February 1953. Design guidelines for the Hercules missile called for maximum use of proven components from the Ajax program and stipulated that both missiles must be compatible with all sets of Nike ground and launching equipment. The primary role of the new system was to attack fast, high flying aircraft formations with a single atomic warhead. The system was to have an alternate conventional warhead for use against single aircraft or missiles.

The tactical version of the Hercules system evolved from several overlapping R&D and industrial programs between 1955 and 1959. During this period, the liquid propellant second stage motor used in the Ajax program was found to be impractical for use in Hercules. In 1956, design of a new, solid propellant second-stage was begun. Known as the XM-30, the new engine was flight tested in 1957, and by early 1958 liquid propellants were eliminated from the Hercules flight test program. Test firings and minor modifications of the system continued through 1960. The system as it existed at that time later became known as the Basic Hercules system to distinguish it from subsequent modifications.

Training of personnel began in 1956 and was conducted at the Ordnance Guided Missile School, Redstone Arsenal; and at the Operational Training Center, FTBL. Deployment of the Basic Hercules system began in June 1958, even while engineering tests continued at White Sands Proving Ground and Redstone Arsenal. Deployment of the Basic Hercules system within CONUS was completed in the fourth quarter of 1961. App. B shows the deployment dates and locations of CONUS Hercules sites.

Hercules deployment, while following the basic pattern of metropolitan defense areas established by Ajax, added several new cities and a number of major military bases to the system. In the final configuration, there was no significant difference in Hercules batteries at different locations or in converted sites as compared to new sites.

During its term of service in the field, the Nike Hercules system underwent numerous design modifications. As previously mentioned, the system as originally deployed became known as the Basic Hercules. Two major

ORIGINAL (Red)

improvement programs were subsequently executed to keep the system up to date. The first resulted in deployment of the Improved Hercules system beginning in 1961. The second produced the Hercules Antitactical Ballistic Missile (ATBM) system, which was first introduced in 1963. Both programs provided improved target tracking, guidance, and interception capabilities by modifying or replacing radar and electronics equipment. Neither produced any significant change in the missile or the battery configuration.

Not all Hercules batteries were retrofitted with the new equipment as it became available, due to budget limitations. The guidelines used provided for retrofitting of certain batteries within a group, based on the number of batteries in a particular defense area. Hence, the field deployment within a single area in 1962 may have included Ajax, Basic Hercules, and Improved Hercules batteries. App. C presents maps of the various Metropolitan Defense Areas showing battery sites as of 1968.

In 1962, the Army began transferring operation of certain Hercules batteries to National Guard Units. Shortly thereafter, deactivation began at numerous locations. By 1970, the Army had deactivated most CONUS Hercules sites. National Guard Units continued to maintain a few sites until the late 1970s. Some Nike Hercules equipment is still retained at FTBL for classroom and operational training of troops from other North Atlantic Treaty Organization (NATO) countries (Cagle, 1959; 1973). The last operational battery at FTBL was deactivated in March 1983.

2.3 ZEUS

Nike Zeus was the first missile developed in the United States that was designed to defend against intercontinental ballistic missiles (ICBM). It was conceived in the early 1950s, and R&D began in 1956. The first test firing of Nike Zeus occurred at White Sands Missile Range on Aug. 26, 1959. The test was unsuccessful, however, since a booster fin failed several seconds after liftoff, causing an abnormally high angle of attack resulting in the rupture of the booster and the breakup of the missile. In October of the same year, Zeus was successfully fired at White Sands. In 1962, Zeus intercepted a Nike Hercules target. Reportedly, the Army installed a complete Nike Zeus complex at Kwajalein Island in the Pacific for full

capability tests against missile targets (Parson, 1962; Secretary of Defense, 1959). Zeus was never approved for production or deployment as a tactical system. However, the basic design concepts used in Zeus were incorporated into later, more sophisticated ATBM systems.

ORIGINAL (Red)

3.0 MILITARY ORGANIZATION OF THE NIKE MISSILE SYSTEM

3.1 NATIONAL AIR DEFENSE ORGANIZATION

The development of a missile-based air defense system was paralleled by changes in command structure and defense organization, beginning in July 1950, when the Army placed all artillery units with continental air defense missions under the newly organized U.S. Army Antiaircraft Command (ARAACOM) at Ent Air Force Base in Colorado Springs, Colo. The installation of Nike Ajax batteries in CONUS and overseas in 1953 led to further reorganization of the continental air defense structure and the Army's antiaircraft missions and organization. On Sept. 1, 1954, ARAACOM and corresponding elements in the U.S. Air Force (USAF) and U.S. Navy (USN) were combined to form the Continental Air Defense Command (CONAD) at Colorado Springs under the direction of the Joint Chiefs of Staff. In 1957, the Army's air defense responsibility within CONAD was defined as point air defense by missiles fired from the ground to aerial targets not more than 161 kilometers (km) away. Point defense was to include "geographical areas, cities, and vital installations that could be defended by missile units which received their guidance information from radars near the launching site" and also was to include responsibility of a ground commander for air protection of his forces. To represent this expanded, all-missile role more clearly, ARAACOM was redesignated the U.S. Army Air Defense Command (ARADCOM) on Mar. 21, 1957.

Further development on a national scale occurred in September 1957, when the North American Air Defense Command (NORAD) was formed to combine air defense capabilities of Canada and the United States under one Commander in Chief, who also headed CONAD. Like CONAD, NORAD elements in the United States reported directly to the Joint Chiefs of Staff. All Army ARADCOM units were placed under the operational control of NORAD (Cagle, 1973). App. D contains maps of geographic areas of responsibility for ARAACOM, ARADCOM, and NORAD for the period 1950 to 1973.

3.2 NIKE SYSTEM ORGANIZATION

During the period 1945 to 1951, R&D on the Nike program was directed by the Office of Chief of Ordnance (OCO). In 1951, OCO transferred to Redstone

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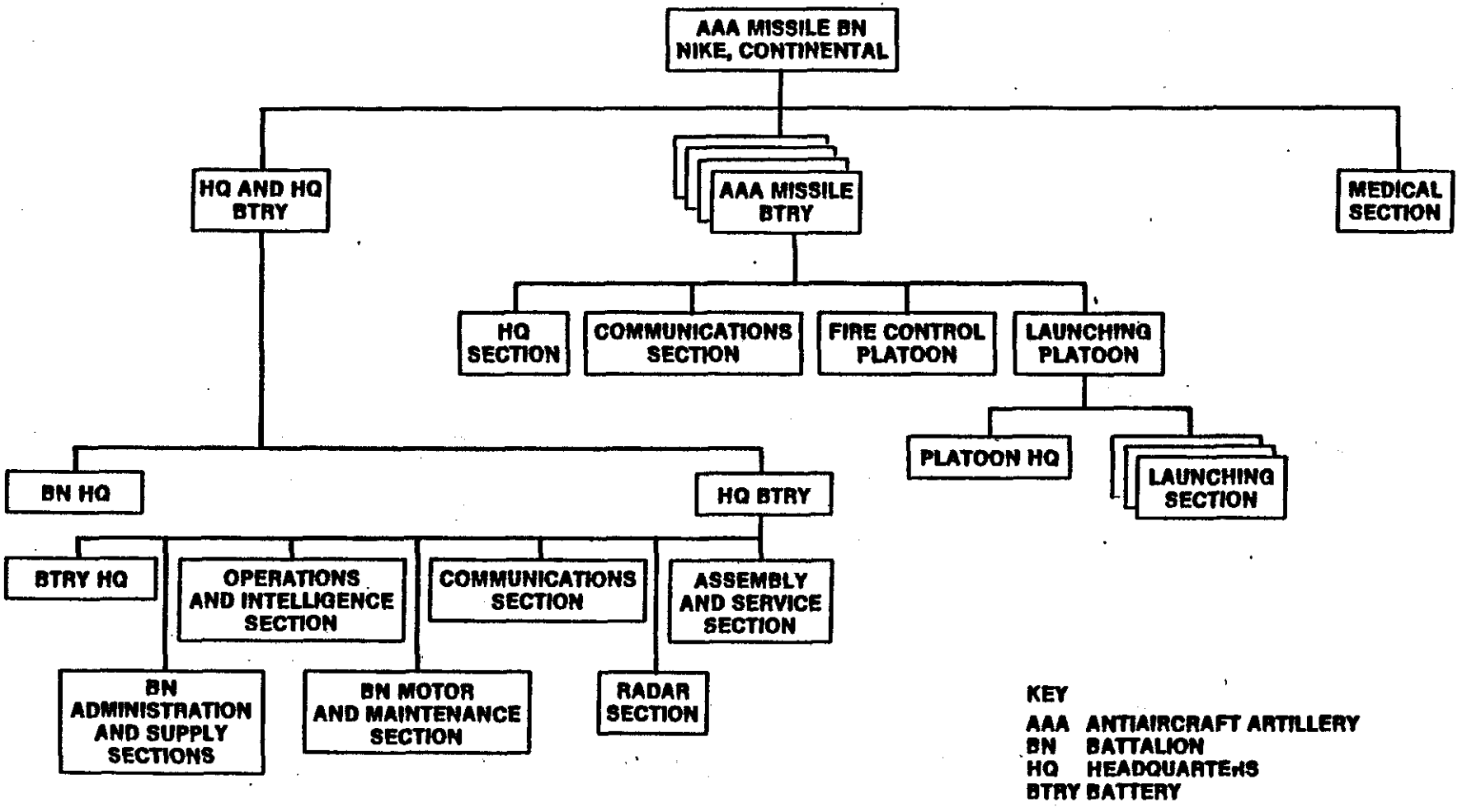
Arsenal, Ala., responsibilities relating to monitoring, coordinating, and conducting technical aspects of the program, particularly contractor-government coordination. OCO retained responsibility for general direction and decision making on policy, scope, objectives, and major modifications to missile design, performance, and operation.

In March 1958, prior to the deployment of the first Nike Hercules battery (June 1958), the U.S. Army Ordnance Missile Command (AOMC) was established at Redstone Arsenal. Subsidiary activities under the direction of AOMC included the Army Rocket and Guided Missile Agency (ARGMA), the U.S. Army Ballistic Missile Agency (ABMA), the Jet Propulsion Laboratory, White Sands Proving Ground, and Redstone Arsenal. ARGMA assumed responsibility for Nike Hercules from Redstone. Under the command of AOMC, ARGMA guided the Nike program through deployment of the Basic Hercules system and the subsequent Improved Hercules system, initial development of the ATBM Hercules system, and final conversion of Ajax systems to Hercules systems.

In 1961, both ARGMA and ABMA were disbanded. Two new missile systems groups were created under AOMC, one for ballistic missiles and one for guided missiles. Responsibility for the Nike program was assigned to the latter group. In 1962, further Army reorganization led to the establishment of two new commands: the U.S. Army Materiel Command (AMC), which replaced OCO, and the U.S. Army Missile Command (MICOM), which replaced AOMC. MICOM exercised control over Nike Hercules until system development ended in 1971. At that time, responsibility for Hercules fell to the Air Defense Special Items Management Office (ADSIMO), a small management office under MICOM (Cagle, 1973).

3.3 NIKE BATTALION ORGANIZATION

The basic operational unit of the Nike missile system was the fire unit, or launching section, composed of a control station and four launchers. In general, three firing units made up a battery, and four batteries formed a battalion. Fig. 3.3-1 depicts the organization of a typical Nike battalion,



SOURCE: U.S. Army, 1956.

Figure 3.3-1
ORGANIZATION OF A TYPICAL NIKE BATTALION

Prepared for:
U.S. Army Toxic and Hazardous Materials Agency
Aberdeen Proving Ground, Maryland

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which consisted of a headquarters and headquarters battery, four firing batteries, and a medical section (U.S. Army, 1956). In the case of Nike Ajax, the battalion was operated by over 400 personnel, who typically handled 48 launchers and associated equipment (Ordway and Wakeford, 1960).

The headquarters and headquarters battery was composed of the battalion headquarters and the headquarters battery, which, in turn, comprised the following seven elements: (1) battery headquarters, (2) battalion administration and supply section, (3) operations and intelligence section, (4) battalion motor maintenance section, (5) communications section, (6) radar section, and (7) assembly and service section. The assembly and service section was a team of technical experts who supervised and assisted in the assembly, testing, and performance of organizational maintenance on missiles and boosters.

A missile battery was composed of six elements. These are listed below, followed by brief mission statements:

1. Headquarters Section: The responsibility of the headquarters section was essentially the operational and administrative control of personnel and equipment.
2. Communications Section: This section was responsible for installing and maintaining noncommercial communication nets and operating the commercial communication nets within the battery.
3. Fire Control Platoon: The fire control platoon was responsible for the operation and maintenance of the fire control equipment in the battery control area.
4. Launching Platoon: The launching platoon consisted of one launching platoon headquarters and three launching sections.
5. Launching Platoon Headquarters: The launching platoon headquarters which was responsible for the operation and training of the three launching sections, contained personnel who assembled, tested, and performed organizational maintenance on the Nike missile and maintained the rounds at the launching section.

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6. Launching Section: The three launching sections were responsible for the preparation of the missile and booster for firing after they were delivered to the launching section from the assembly and test area. In addition, they performed routine nontechnical tests, checks, adjustments, and organizational maintenance (U.S. Army, 1956).

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4.0 DESCRIPTION OF BATTERIES

4.1 LAND USE

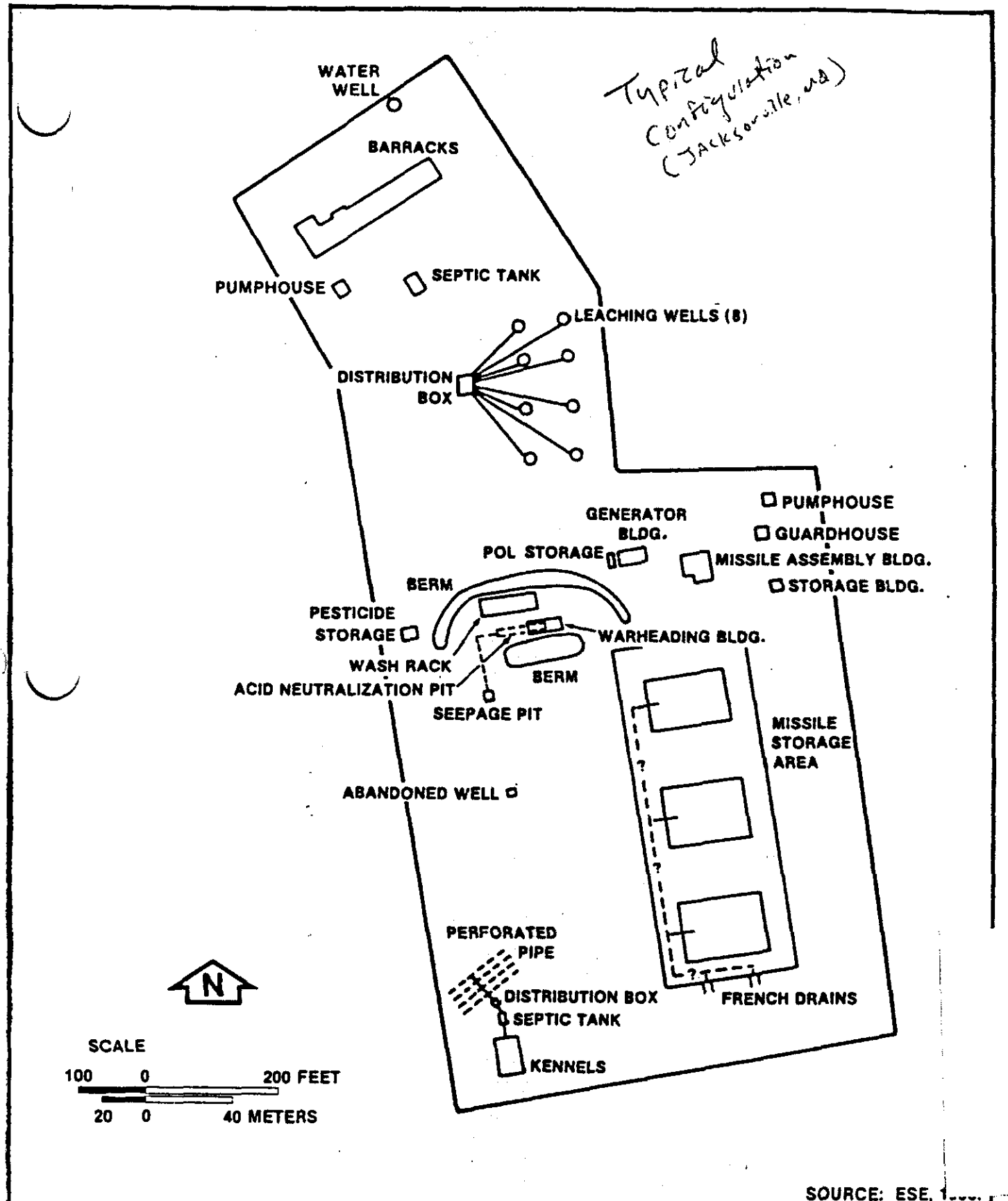
A typical Nike site consisted of two parcels of land. One parcel, the battery control area, was generally about 5 hectares (ha), while the other, the launch area, may have ranged in size from 15 to 30 ha. In some cases, a third parcel, the housing area, was included, adding 10 to 30 ha to the total. The two main areas, which had specific functions relating to battery operation, are discussed below. Equipment limitations dictated these areas could be no closer than 900 meters (m) from each other and no farther than 4.8 km.

The physical arrangement of structures within each area seems to have been site-specific, and no "standard" layouts were encountered. Figs. 4.1-1 and 4.1-2 illustrate the layout of one Nike site which included facilities that were reportedly common to most batteries, such as a motor pool, generator building, acid pit, and missile assembly buildings. Maps of additional sites are included in App. E. This particular site also included more uncommon features such as septic tanks with infiltration wells for liquid waste disposal, a blast protective berm around the warheading area, and barracks in the two operating areas. This indicates the extent to which site-specific methods were found to provide needed services and to make use of available property.

4.2 FUNCTIONS AND FACILITIES OF MAJOR AREAS

The battery control area at a Nike site contained all the radar, guidance, electronic, and communications equipment needed to identify incoming targets, launch missiles, and direct missiles in flight. This equipment included a computer used to determine an intercept point and guide the missile there. The target was identified by acquisition radar (ACQR) and then transferred to target tracking radar (TTR), which tracked the target to the intercept point. Once the battery commander issued the fire command and the missile was in flight, steering and burst orders were transmitted through the missile tracking radar (MTR). These different pieces of equipment were housed in mobile trailers and interconnected with communication cables.

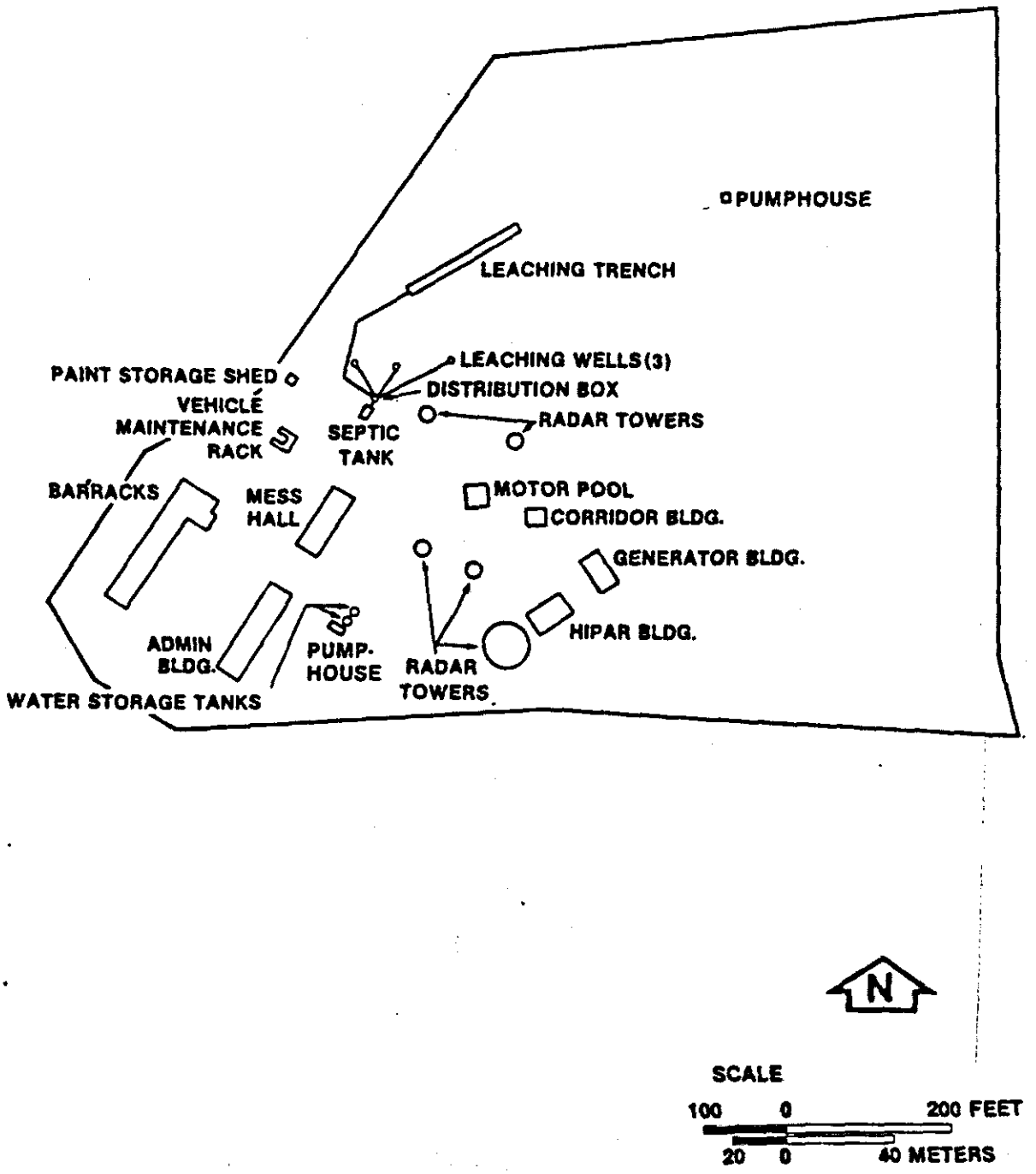
ORIGINAL (Red)



SOURCE: ESE, 1...

FIGURE 4.1-1
LAUNCH CONTROL AREA MAP
PHOENIX MILITARY RESERVATION (BA-03)
JACKSONVILLE, MD.

Prepared for:
U.S. Army Toxic and Hazardous Materials Agency
Aberdeen Proving Ground, Maryland



SOURCE: ESE, 1983.

Figure 4.1-2
BATTERY CONTROL AREA MAP
PHOENIX MILITARY RESERVATION (BA-03)
JACKSONVILLE, MD.

Prepared for:
U.S. Army Toxic and Hazardous Materials Agency
Aberdeen Proving Ground, Maryland

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The missiles and warheads were assembled, serviced, checked, and fired at the launch area of a Nike Ajax site. In general, this area was subdivided into specific locations which were suitably equipped for specific operations. Missiles arrived at the launch site partially disassembled, unarmed, and, in the case of liquid-fueled stages, defueled. All the operations necessary to make the missile flight-ready were conducted in the launch area. Missiles were generally stored in an underground magazine and moved to the launchers by a rail and elevator system, although in some locations, surface storage facilities were used. A single battery included 12 launchers, divided into 3 groups of 4. A full complement of missiles included 1 missile in position and 3 reloads for each launcher (a total of 48 missiles). Because of limitations in the tracking and guidance systems, only 1 missile could be in flight at a time. Since the average flight time was 1 minute, a battery's full complement could be expended in less than 1 hour if the maximum rate of fire were sustained.

Most organizational-level maintenance was conducted in the launch area, which generally included the motor pool and generator buildings in addition to the defuel/refuel facilities. The motor pool and generator buildings were generally equipped with a sump which was routinely used for disposal of the oil, solvents, and paints used in equipment maintenance. These sumps were typically 1 to 2 cubic meter (m^3) excavated pits backfilled with gravel where liquids were simply dumped and allowed to soak into the ground. In some cases, the associated maintenance area had a drain consisting of a concrete trough covered with a metal grate. These drains were designed to carry any liquid spilled in the motor pool or generator area to the sump. This reportedly included sizeable quantities of diesel fuel, since the generator design made spillage during filling likely. Many Ajax batteries had an additional rock-filled pit in the defuel/refuel area used for disposal of inhibited red fuming nitric acid (IRFNA).

At some locations, holding tanks were used for temporary storage of liquid waste as an alternative to onsite disposal. The liquids collected were periodically pumped out for offsite disposal or recycling. This process was widely used to dispose of waste oils, and was sometimes employed for handling a variety of liquids.

The underground magazines included floor drains which routed any liquid to a sump normally located below the missile elevator shaft. These sumps were usually equipped with level-controlled pumps that transferred accumulated liquid to surface drainageways.

The third major area sometimes included at Nike sites was housing area. There was wide variation in the housing arrangements at different sites. In some cases, housing was in a different location than either of the two operating areas. In some cases it was contiguous to one operating area, or possibly split between the two. At locations where it was available, many personnel used nearby commercial housing.

Fuel storage tanks were a normal component of the operating areas. Total onsite storage ranged as high as 24,000 liters (1) and included fuel oil, diesel fuel, and gasoline. It was reported that most bulk storage was in underground tanks, although aboveground tanks, mobile tanks, and drum storage were also used.

4.3 OUTSIDE SUPPORT REQUIREMENTS

During normal daily operations, Nike sites used commercial electrical supplies where they were available. Transformers used in the electrical distribution system may have contained or been contaminated with polychlorinated biphenyls (PCBs), although records confirming this possibility were not located. The generators included in battery equipment were used for standby and emergency power. They were run under full load at intervals to ensure readiness in the event that commercial supplies were disrupted.

Water supplies for most batteries were obtained from municipal sources. For more remote sites, wells were used. In one instance well water was reportedly used for non-potable uses, and drinking water was trucked to the site. If municipal sewers were available, they were used to dispose of wastewater. Where such service was not available, septic tanks, oxidation ponds, or package treatment plants were used.

Solid waste generated at Nike facilities was disposed of through a variety of means. Often, the unit would have an agreement with a municipality for use of a public landfill. Very few of the Nike sites included an operational landfill. Numerous instances were reported that where convenient, open areas on or near the site were used for dumping of any and all waste. During deactivation, excess supplies (including solvents and paints which might be on hand but not shown on property records or otherwise accounted for) were routinely dumped at such sites as an expedient method of "balancing the books" before final site closure.

Buildings at most sites were heated by small oil-burning boilers. The fuel for these boilers was a major part of the petroleum, oils, and lubricants (POL) stored onsite. Reportedly, some sites in Alaska used turbine-type space heaters fueled with JP-4 in place of the oil-fired units.

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5.0 DESCRIPTION OF THE NIKE MISSILES AND EQUIPMENT

5.1 AJAX

5.1.1 CONSTRUCTION

Nike Ajax was a 2-stage, supersonic missile armed with three large-radius, spherical-burst, high-explosive warheads mounted in the nose, center, and aft sections of the missile. The first stage was powered by a solid-propellant booster. The initial booster design included a cluster of four solid-propellant rockets with large fins. At the production stage, however, the design was modified to provide more rapid guidance response by means of a single, small-finned booster. In the second stage, the missile was powered by a liquid-fueled sustainer motor. The missile itself displayed three sets of cross-shaped fins in addition to those on the booster. The forward set was for steerage, the middle set may have been used for sensing, while the rear set provided stability (Burgess, 1957). Construction and performance data for the Nike Ajax missile are summarized in Table 5.1-1, and a schematic diagram of the basic missile configuration is shown in Fig. 5.1-1.

To control flight and engage the warheads, Nike Ajax used a guidance system coordinated with radar units on the ground. The guidance equipment was located within the cylindrical missile casing, along with the fuel tanks and ignition mechanism. The ACQR initially identified the target and alerted the battery control area, where the TTR picked up the target at close range and tracked it throughout the engagement. The third radar, the MTR, locked onto the missile prior to firing and tracked it throughout its flight. The two tracking radars fed target and missile present position data into a computer located in the battery control trailer. The computer then determined a predicted point of interception and issued steering orders to guide the missile to that point. At the optimum time, the computer issued a burst order which detonated the three warheads simultaneously, destroying the target. This process is depicted in Fig. 5.1-2 (U.S. Army, 1956; Ordway and Wakeford, 1960).

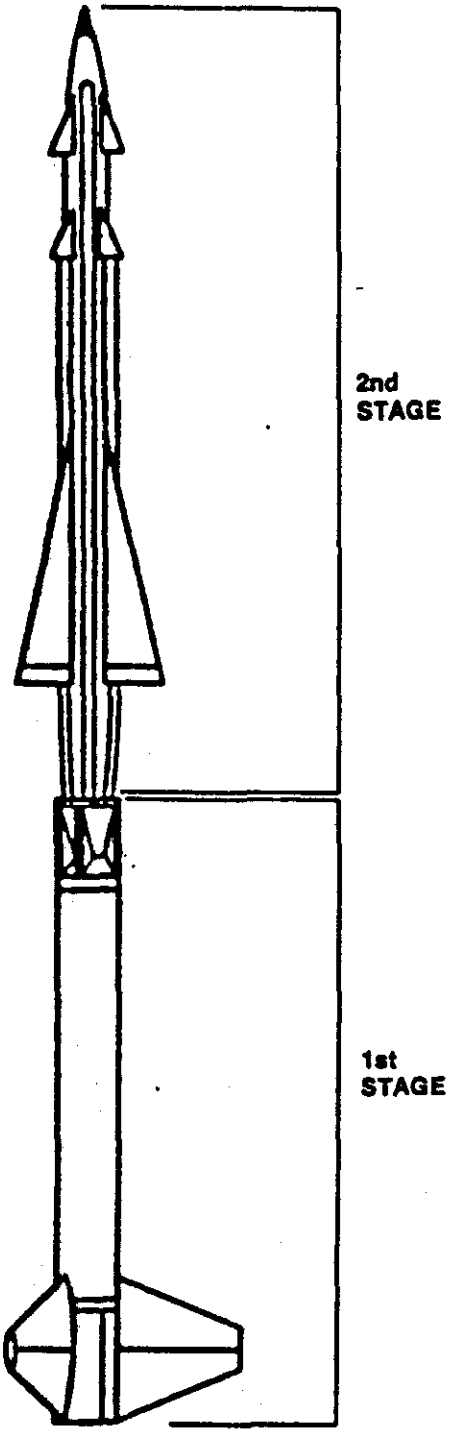
The Ajax was launched by remote control from a nearly vertical position. The entire missile system (consisting of the launcher, ACQR and TTR, and

Table 5.1-1. General Construction and Performance Data for the Nike Ajax

Characteristic*	Specification
Length (m)	6.4 (10.8 with booster)
Diameter (cm)	30.5 (booster, 40.6)
Weight (kg)	
Loaded	1,114.6
Payload	136.2
Range (km)	40.25
Altitude (km)	16.1 - 19.2
Velocity (maximum in kph)	2,400
Sustainer Thrust (kg)	1,180.4
Sustainer Firing Time (seconds)	30
Sustainer Propellants	Nitric Acid and JP-4
Booster Propellant	Solid

* m = meters
cm = centimeters
kg = kilograms
km = kilometers
kph = kilometers per hour

Source: Modified from Ordway and Wakeford, 1960.



SOURCE: Ordway and Wakeford, 1960.

Figure 5.1-1
BASIC CONFIGURATION OF THE NIKE AJAX MISSILE

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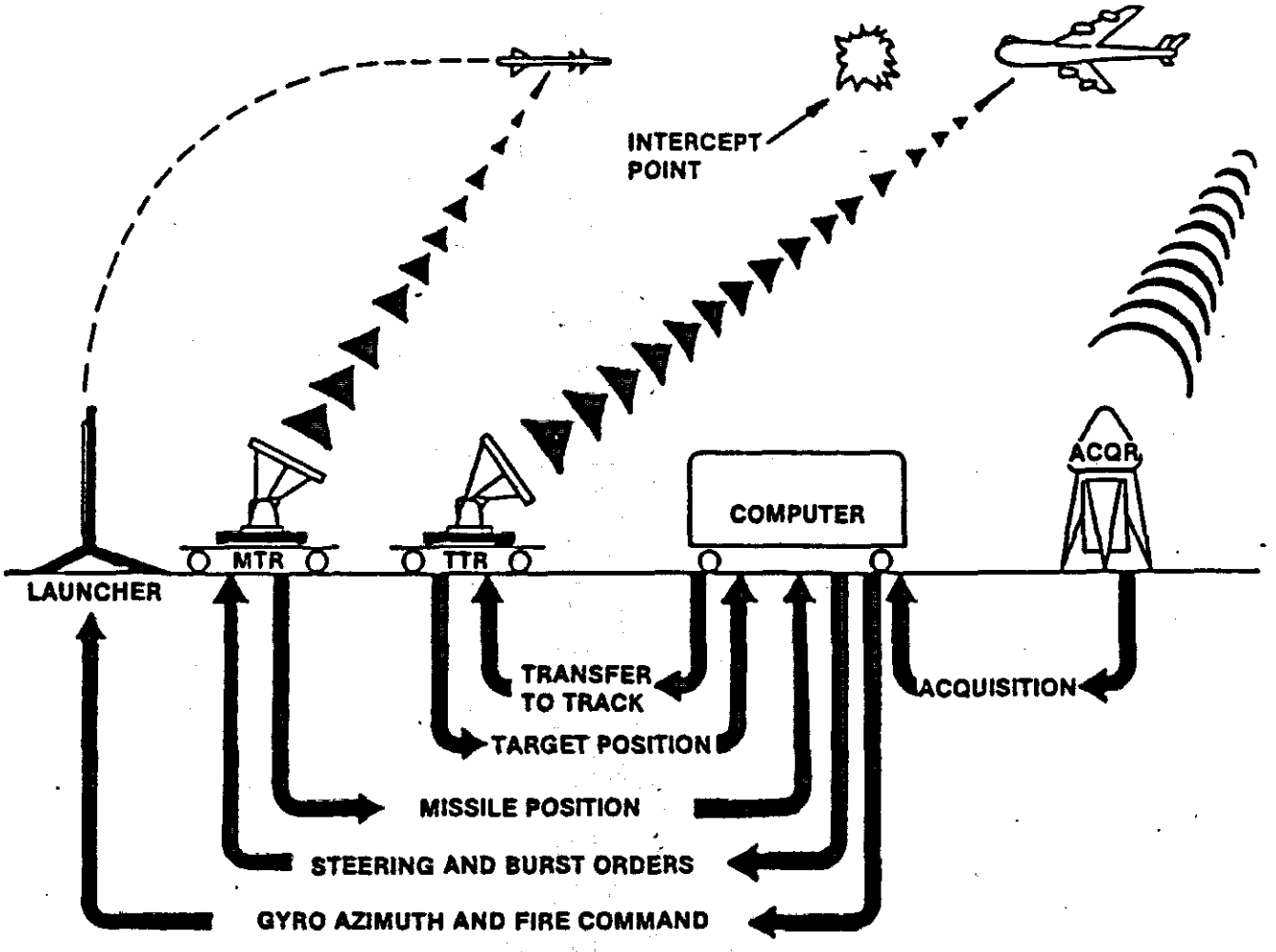
Aberdeen Proving Ground, Maryland



KEY

MTR	MISSILE-TRACKING RADAR
TTR	TARGET-TRACKING RADAR
ACQR	ACQUISITION RADAR

SOURCE: U. S. Army, 1956.

Figure 5.1-2
TRACKING-INTERCEPT PROCESS OF THE NIKE AJAX MISSILE

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Aberdeen Proving Ground, Maryland

related control equipment) was mobile, capable of being packaged into lightweight, van-type trailers (Ordway and Wakeford, 1960; Burgess, 1957).

5.1.2 PROPELLANTS

The Ajax first stage was powered by the XM-5 booster, which burned a cast, double-based solid propellant. The propellant grain and igniter were contained in a steel casing, which fell to the ground intact after burnout. Under normal conditions, the booster had a total burn time of 3.4 seconds, at the end of which it was jettisoned and the missile entered the second stage.

The Ajax second stage burned jet fuel (JP-4), with IRFNA used as an oxidizer. Aniline/furfuryl alcohol, later replaced by unsymmetrical dimethyl hydrazine (UDMH), were used as a starter fluid. In normal flight, the sustainer motor burned for 70 seconds and consumed 135 kilograms (kg) of JP-4 (Burgess, 1957; Cagle, 1973).

5.1.3 WARHEADS

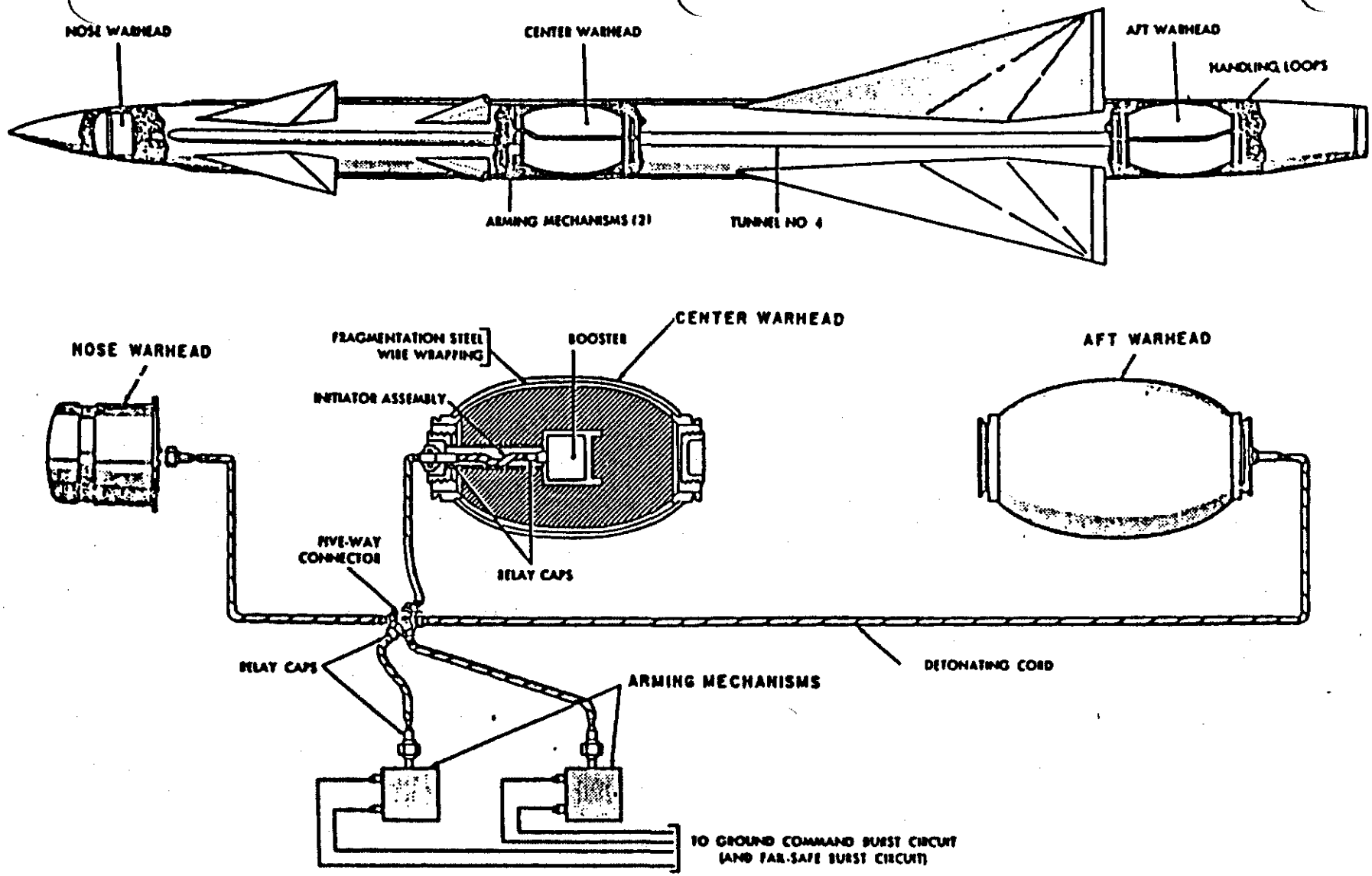
Nike Ajax was armed with three high-explosive warheads. As shown in Fig. 5.1-3, these were mounted to the nose, center, and aft of the missile. The warheads were activated by two arming mechanisms and five detonating cords, following burst orders issued by the computer in the battery control trailer (U.S. Army, 1956).

5.1.4 SUPPORT EQUIPMENT

The equipment utilized in each of these areas is itemized below, as described in Procedures and Drills for the Nike I System (U.S. Army, 1956).

<u>Battery Control Area</u>

1. <u>ACQR</u>: This radar, composed of the acquisition antenna, receiver, and transmitter, was used to detect, observe, identify, and designate selected targets. Operator controls and displays were located in the battery control trailer.



SOURCE: U. S. Army, 1956.

Figure 5.1-3
NIKE AJAX WARHEAD
POSITIONS AND CONSTRUCTION

Prepared for:
U.S. Army Toxic and Hazardous Materials Agency
Aberdeen Proving Ground, Maryland

2. TTR: This radar was composed of the tracking antenna, receiver, and transmitter, mounted on a drop-bed antenna trailer. The three operator's controls and displays (azimuth, elevation, and range) were located on the target console in the radar control trailer. The TTR tracked the designated target and furnished target present position data to the computer.
3. MTR: This radar was composed of the missile-tracking antenna, receiver, and transmitter, mounted on a drop-bed antenna trailer. The operator's controls and displays were located on the missile console in the radar control trailer. The MTR tracked the missile, supplied the computer with missile present position data, and provided a communication link for transmitting orders from the computer to the missile. The MTR was similar in appearance to the TTR.
4. Battery Control Trailer: The battery control trailer contained the acquisition radar cabinet assembly, the battery control console assembly, the computer assembly, an early warning plotting board, and an event recorder and switchboard cabinet assembly. The battery control console assembly contained the displays and controls required by the acquisition radar operator, the battery control officer, and the computer operator.
5. Radar Control Trailer: The radar control trailer contained the target console assembly, the missile console assembly, the radar power cabinet assembly, and the radar range and receiver cabinet assembly. The missile and target consoles contained the controls and displays required for the MTR and TTR operators.
6. Radar Collimation Mast Assembly: This assembly was composed of the radar frequency test set, the radar collimation mast, and the target-head assembly. It was used in collimating, testing, and adjusting the MTR and TTR.
7. Electrical Generating Equipment: This equipment produced the necessary electrical power to operate the equipment in the fire control area. Commercial power with electrical converters to change 60-cycle power to 400-cycle power was utilized where available.

8. Battery Control Area Cable System: This cable system interconnects the various elements in the battery control area.
9. Interarea Cable System: The interarea cable system included the cables necessary to connect the battery control area with the launching area. When cable installation and easement costs for the interarea cable were excessive, wire and radio voice control were used.
10. Maintenance and Spares Trailer: This trailer provided facilities for storing portable test equipment, spare components, and spare parts. Components of the ACQR were carried in this trailer during march order.

Launching Area

1. Launching Control Trailer: The launching control trailer contained the launching control panel, the launching control switchboard, and the test responder. The launching control panel contained the controls, displays, and communications equipment necessary to supervise and monitor the activities of the launching sections during an engagement and to act as a relay station between the launching sections and the battery control area.
2. Launching Section Control Cabinet: This cabinet, located underground in the underground magazine storage-type sites or in the launching section revetment in aboveground installations, contained the necessary controls, indicators, and communication facilities to enable a launching section to control the preparation and firing of its rounds. It also coordinated the activities of the launching section with the launching control panel operator in the launching control trailer. It consisted of a launching section control panel and a launching section power cabinet.
3. Launcher-Loader Assemblies: The launcher-loaders provided the equipment necessary to accomplish the physical operations at the launching site for storing, loading, and firing the rounds.
4. Electrical Generating Equipment:
   a. Aboveground sites--electric power for aboveground sites was supplied by 400-cycle, 30-kilowatt (kW) engine generators, or by commercial sources with suitable converters when available.

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b. Underground sites--electric power for underground sites is supplied by 150-kW, 60-cycle diesel generators or by commercial sources, when available. Direct 60-cycle power was used for the elevator. Where 400-cycle power was required, the 60-cycle power was converted to 400-cycle power by means of frequency converters.

5. Launching Area Cable System: This system interconnects the various elements of the launching area.

5.2 HERCULES

5.2.1 CONSTRUCTION

Preliminary design of Nike Hercules called for a 2-stage system, employing a cluster of four Ajax XM-5 propellant boosters rigged to burn as one motor and fitted into a single casing in conjunction with four Ajax liquid propellant (later changed to solid propellant) sustainer motors. The mission of the system was to attack, with one atomic warhead, aircraft formations traveling at speeds up to 1,600 kph and at altitudes up to 18,288 m. The horizontal range of the missile from the launching site was to be approximately 45,700 m.

As finally developed, the Ajax and Hercules missiles could be launched from the same site. The Hercules was launched vertically and was propelled through the first stage of flight by the booster, which was jettisoned following propellant burn out. The sustainer motor then was ignited and carried the missile to its maximum height. Stabilization and steerage were accomplished by four fixed fins with trailing-edge control surfaces mounted to the aft of the missile. The Hercules guidance system was similar to that of the Ajax missile, was composed of an ACQR for locating all targets within range, a TTR to provide continuous surveillance of the target once identified, and an MTR (command guidance) radar to lock onto the missile itself and guide it to the intercept point.

In outward appearance, the Hercules was similar to the Ajax (see Fig. 5.2-1). As demonstrated by the construction and performance data listed in Table 5.2-1, however, Hercules was in every way a larger, more powerful weapon than the Ajax.

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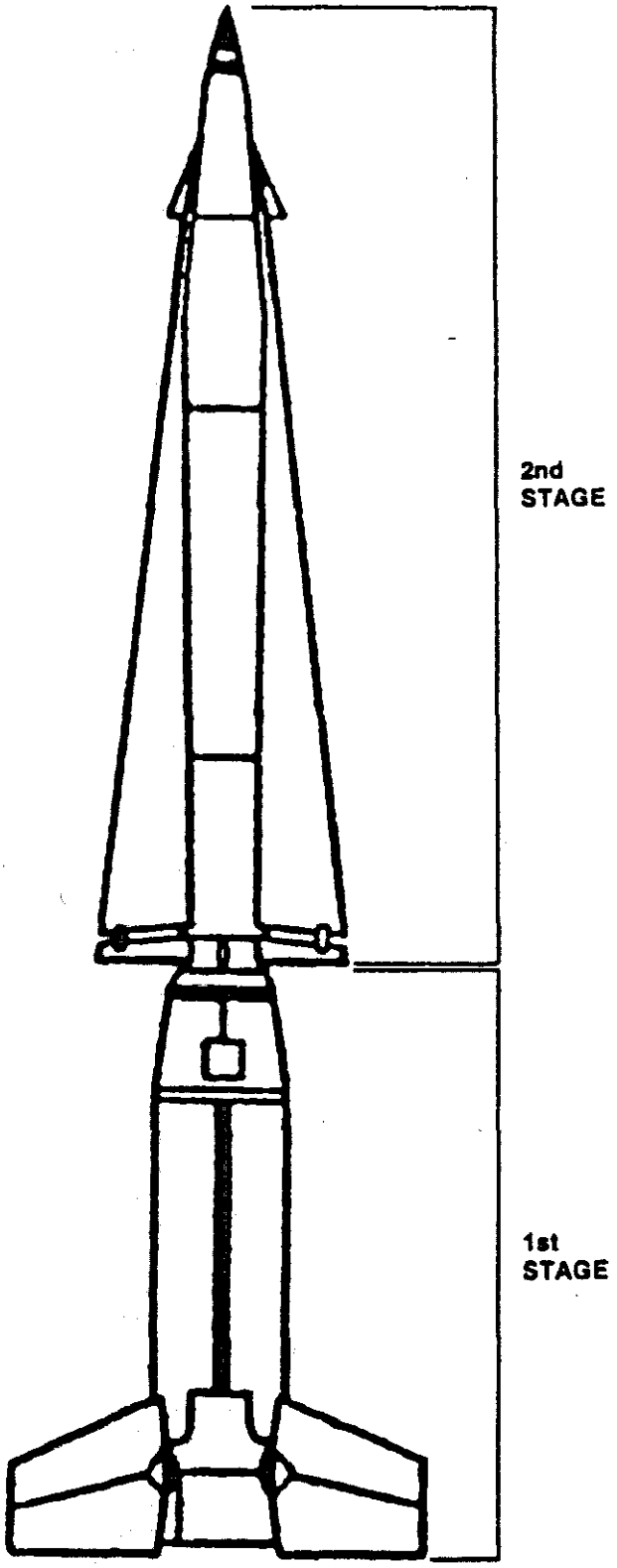
Table 5.2-1. General Construction and Performance Data for the Nike Hercules

Characteristic	Specification
Length (m)	8.2 (11.9 with booster)
Diameter (cm)	80
Weight (kg)	
Loaded	2,270 (4,721.6 with booster)
Payload	454
Range (km)	120 - 128
Altitude (km)	56
Velocity (kph)	3,528
Sustainer Thrust (kg)	4,540
Sustainer Propellant	Solid
Booster Propellant	Solid
Booster Firing Time (seconds)	4

Source: Modified from Ordway and Wakeford, 1960.



SOURCE: Ordway and Wakeford, 1960.

Figure 5.2-1
BASIC CONFIGURATION OF THE
NIKE HERCULES

Prepared for:
U.S. Army Toxic and Hazardous
Materials Agency
Aberdeen Proving Ground, Maryland

5.2.2 PROPELLANTS

As mentioned in Sec. 5.2.1, the first stage of the Hercules missile was powered by the solid-propellant XM-5 cluster, which became standardized for the Hercules system. The second-stage sustainer motor was modified throughout the system development. Initial test models used a liquid sustainer motor fueled by a mixture of 40-percent UDMH and 60-percent JP-4, which was known as JPX. Between 1955 and 1956, the sustainer cluster was redesigned using motors fueled by JP-4, with IRFNA as an oxidizer.

The liquid sustainer motors continually malfunctioned during Hercules testing; therefore, a solid-propellant sustainer motor of the XM-30 series was developed and accepted in 1958 as a replacement for the liquid propulsion system. This model was fueled by an ammonium perchlorate-type propellant. Conversion to the solid propellant required general missile redesign, including rearrangement of the warhead and guidance systems within the missile casing (Cagle, 1973; Ordway and Wakeford, 1960). All Hercules missiles deployed at Nike batteries used the solid fuel engines.

5.2.3 WARHEADS

The primary warhead arming the Hercules missile was nuclear. Large nuclear payloads were designed for use against aircraft formations, while smaller payloads were employed against single aircraft. Other types of warheads, including high-explosive and fragmentation, were developed for use against low-altitude targets (Cagle, 1973).

5.2.4 SUPPORT EQUIPMENT

The basic Hercules battery, which utilized existing Ajax equipment to the fullest extent possible, involved three basic operations carried out in the launch area: assembly and testing, fueling and warheading, and launching. Equipment associated with each of these activities is listed in Table 5.2-2. In addition, this table designates which pieces of equipment were unique to Hercules, which items were developed to permit co-use by Ajax and Hercules, which were modified Ajax pieces, and which were unmodified Ajax items.

The design of the Hercules launching and handling equipment was essentially the same as that of the Ajax equipment. It remained virtually unchanged

Table 5.2-2. Support Equipment Characteristic of the Nike Hercules Battery

Equipment	No. Required For Hercules	New For Hercules Only	New For Ajax/Hercules	Modified Ajax	Existing Ajax
Assembly and Testing					
1. Capping Compressor	1				X
2. Propulsion Plumbing System Test Assembly	1			X	
3. Missile Dolly	3	X			
4. Warhead Section Adapter	3	X			
5. Main Body Hoist Beam	1	X			
6. Auxiliary Power Unit Fueling Equipment	1	X			
7. Missile Handling Rings	5 sets	X			
8. Hydraulic Test Stand	1			X	
9. Test Assembly Missile Electrical Equip.	1			X	
10. Servicing Assembly Propellant Draining	1			X	
11. Miscellaneous Tools and Equipment	1			X	
Fueling and Warheading					
1. Fuel Fill Equipment	1		X		
2. Propellant Hoist Assembly	1		X		
3. Oxidizer Fill Equipment	1		X		
4. Warhead Section Dolly	2	X			
5. Missile Hoist Beam	1	X			
6. Warhead Section Hoist Beam	1	X			
7. Booster Cluster Hoist Beam	1	X			
8. Booster Cluster Dolly	2	X			
9. Jato Hoist Beam	1				X
Launching					
1. Launcher	3		X		
2. Loading Racks	17		X		
3. Loading Frame	1		X		
4. Launching Rail	6	X			
5. Portable Test Set	1	X			
6. Portable Test Equipment Dolly	1				X
7. Launching Section Operation Equipment	1			X	
8. Launching Control Trailer	1			X	
9. Missile Booster Transporter Trailer					X
10. Trailer Adapter					

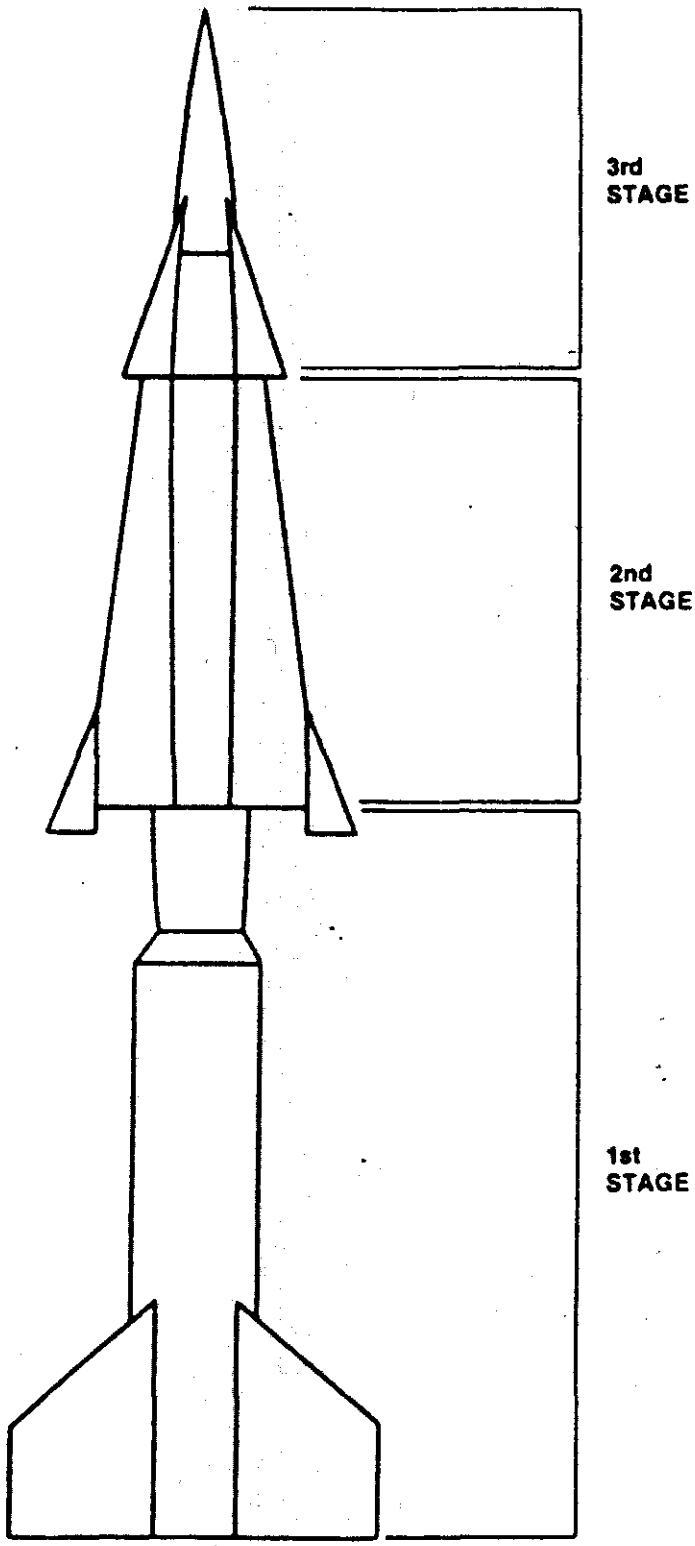
Source: Cagle, 1973.

ıghout the life of the missile system. The basic guidance and control systems, however, were modified through the years to keep pace with advances in target aircraft technology (Cagle, 1973; Ordway and Wakeford, 1960).

5.3 ZEUS

Approximately 15.2 m in length, Nike Zeus was a 3-stage, solid-propellant missile capable of 204,300 kg of thrust in the first stage. It had a 480-km range and 320-km average altitude. Equipped with a nuclear warhead, it was the most powerful missile of its time (Ordway and Wakeford, 1960; Parson, 1962). The basic configuration of the Zeus is shown in Fig. 5.3-1.

The principles of guidance and propulsion used in the Zeus were the same as those for Ajax and Hercules (see Fig. 5.1-2). The warhead support system differed, however, in that it reportedly detected the entry of an ICBM target into the atmosphere by means of electro-magnetic disturbances created by the target (Parson, 1962).



SOURCE: Ordway and Wakeford, 1960.

Figure 5.3-1
BASIC CONFIGURATION OF THE
NIKE ZEUS MISSILE

Prepared for:
U.S. Army Toxic and Hazardous Materials Agency
Aberdeen Proving Ground, Maryland

6.0 LIFE CYCLE OF TYPICAL NIKE BATTERY

The following sections describe the typical operations and activities associated with the construction, deployment, operation, maintenance, and conversion/deactivation of a Nike battery (Ajax and Hercules). The focus is on those operations and activities having the potential to generate toxic and hazardous materials.

6.1 AJAX

6.1.1 DEPLOYMENT

All Ajax systems were deployed on sites not previously established for missile deployment and on land for the most part acquired from civilian landowners. As a result, site preparation and construction was a much more significant activity than with subsequent deployment of Hercules systems, most of which were deployed at existing Ajax battery locations.

Limited specific information regarding site preparation was found, as the majority of battery personnel arrived after much of the initial site construction was completed. Initial site preparation involved cutting and filling to provide smooth terrain for subsequent construction and excavation for magazines. Rugged terrain necessitated removal of material from the site. The disposition of this material and subsequently excavated material is not known, although it likely depended upon local need for fill or the presence of a suitable local dumping area.

The preparation of earthen pads for the subsequent construction of buildings, concrete pads, and vehicle areas was also necessary. Some site drainage alterations were probably required.

Establishment of utilities service was also part of site preparation. This included laying pipe for water and/or sewer services, well construction, and laying pipelines for fuel oil or natural gas supply, all dependent upon the provisions for utility service to the site. Also, at least at some sites, landfills were established for waste disposal.

Major construction at the three main battery areas included:

- o Launch area -- Magazine and elevators
  - Launch pads
  - Material storage buildings
  - Assembly building(s)
  - Repair building(s)
  - Latrine(s)
- o Battery Control Area -- Launch control building(s)
  - Generator pads
  - Radar and tower pads
  - Latrine(s)
  - Material storage area
- o Barracks -- Barracks
  - Mess hall
  - Latrines
  - Recreation/support services

Ancillary construction activities included some or all of the following:

- o Placement of non-missile fuel tanks;
- o Construction and placement of auxiliary generator pads;
- o Construction of fences and gates;
- o Placement of utility poles, lines, switching yards;
- o Placement of water and sewer lines; and
- o Placement of natural gas or fuel oil lines.

Utility construction depended primarily on how service was provided to the site. Nike batteries generally used existing commercial sources, and therefore, only onsite connections and distribution systems were necessary. Where sewerage was handled onsite, no connections were necessary.

Missile assembly primarily involved the unification of missile components shipped inert to the site in special containers. Components were removed from the containers and assembled, generally in a designated assembly area or building.

Additionally, assembly operations involved attaching and aligning the fins and mounting the missile to the launch carriage or assembly. Warhead placement, also a part of the initial assembly, was performed in a designated "warheading" building. Additional aspects of assembly involved pressurization, addition of hydraulic fluids, and connection of electrical/electronic cable systems for integration with Launch Control.

Assembly operations presented minimal potential for contaminant generation, although there was some use of solvents for cleaning of electrical contacts and assembly points. There was also some spillage of hydraulic fluids during the initial filling process.

Testing of missiles and support equipment at battery sites was limited to integrity/function testing of electrical, electronic, hydraulic, and mechanical systems. In addition, testing of personnel response and mobilization was conducted. All firing was restricted to designated proving ground ranges.

In the permafrost regions of Alaska and Greenland, aboveground facilities and the installation of refrigerant systems to cool any surfaces contacting the ground were required.

6.1.2 OPERATION

During the operational life of an Ajax battery, several onsite operations involved toxic and hazardous materials. These operations included fueling, defueling, and the addition/changeout of missile constituents; support equipment maintenance and repair; and materiel handling and storage. Approved general operational procedures appear to have been consistent throughout CONUS, although many battery-specific variations were found.

Contaminants of concern for the Ajax missile include liquid fuel, UDMH, aniline, and IRFNA. In general, these materials were handled so as to generate minimal spillage or ground contamination, primarily due to concerns for the safety of battery personnel. Typically, these materials were pumped or gravity fed into the missile from containers and returned to containers for turn-in during maintenance or disassembly. Some spillage occurred from

line disconnecting and flushing, but in most instances this was limited. Spillage was typically washed into a ground sump at the fueling/defueling point.

Some batteries reportedly made routine use of a sump for disposal of IRFNA. Magazine areas infrequently received spillage of fuels and hydraulic fluids from component leakage or rupture. In such cases, the majority of the spillage was handled by absorbent rags or compounds which were subsequently disposed of offsite with domestic trash. The area was then washed down. Wash water went to the magazine sump and was subsequently pumped to the surface, and discharged to the surface drainage system.

With the Ajax system, a 2-year rotational maintenance protocol was established about 1960. Prior to this, there was no routine maintenance of the missile or launcher, but only "as-needed" maintenance and repair. Rotational maintenance involved removal and replacement of fuel, UDMH, and IRFNA. In addition to the 2-year rotational maintenance, electrical batteries were changed-out monthly (one battery per missile). Battery acid was disposed of in a variety of ways, including dumping into a ground sump, dumping into a soda pit, pouring into a soda drum, or pouring into the latrines.

Disposal of hydraulic fluid from missiles varied, dependent again on the individual battery. Sometimes the fluid was flushed into drums for turn-in, flushed into a ground sump, or used for weed control around buildings and fences. Most of the hydraulic fluid used was contained in missile launchers. This fluid was changed annually or more frequently, in some cases. Quantities of hydraulic fluid dumped reportedly ranged from 1,900 to 3,785 l per year. In addition, hydraulic fluid spills in the magazines and at launch pads were common, both from routine maintenance and rupture of lines.

Support equipment maintained onsite included launchers, vehicles, and electrical generators. The typical Ajax battery had a 10- to 12-vehicle

motor pool split between the battery control and launch areas and one or sometimes two generator buildings. Only organizational maintenance (oil changes, tune-ups, and minor repair) was conducted at the battery site. Primary wastes generated from support equipment maintenance were battery acid, waste oil, brake fluid, transmission fluid, and spent solvents.

Vehicle, generator, and launcher maintenance/repair conducted in the launch area generally involved the use of various solvents, cleaners, paints, and thinners. Notable were trichloroethane, trichloroethylene, toluene, carbon tetrachloride, acetone, and alcohol. These were used for a variety of functions, including cleaning of contacting parts, cleaning of grease spills or stains, and overall cleaning in preparation for painting.

Typically, the use of solvents and cleaners was concentrated in the launch area and repair areas. Quantities used at any one time were generally low, with little waste generated. However, at certain batteries and prior to inspection, much larger quantities were used for general surficial cleaning. Typical quantities used reportedly ranged from 30 to 120 l per month for trichloroethylene and 190 to 380 l per month for other solvents, primarily non-chlorinated hydrocarbons such as Stoddard solvents or PD-680.

Waste solvents and cleaners were typically poured into a ground sump where they soaked into the ground, but were sometimes drummed for turn-in. When larger quantities were used for overall cleaning, residues were washed into a sump or onto the ground surface. Battery acid was dumped into a sump or otherwise disposed of onsite. Waste oil was frequently dumped into a sump, although drumming for turn-in was also commonly practiced.

Maintenance/repair activities at the battery control area centered on electrical and electronic equipment and components. Primary substances used in maintenance were the same solvents and cleaners used in support equipment maintenance. These were used in small quantities to clean electronic components and contacts; the process was often followed by blow-drying. Wastes were thus minimal and would have been dumped on the ground or into a sump.

Equipment replacement in the battery control area included small capacitors and transformers and low-level radiation sources such as dials and electron tubes. These were typically turned in to property disposal channels. When tube breakage did occur, it was handled by bagging and turn-in for disposal.

Maintenance/repairs in the barracks area were generally limited to typical cleaning, painting, carpentry, plumbing, and electrical activities. The only wastes of concern generated would be paint, paint thinners, and possibly cleaning agents (caustics, soaps). Paint waste and waste thinners were likely ground dumped or poured into latrines, as would also likely be the case with the cleaning agents.

It is not known if mess halls were equipped with grease traps and, if so, how these were emptied and how the grease was disposed of. Other garbage would likely have been hauled offsite with other domestic trash.

All chemicals and fuels used for missile operation, as well as solvents, paints, and cleaners used in the maintenance of equipment, were stored in designated buildings or on concrete sand-bag bermed pads with or without roofs. Solvents and cleaning agents were routinely kept on hand in 55-gallon (gal) drums. Materials were segregated based on compatibility, resulting in a number of storage buildings or areas. Buildings generally had bermed floors to contain leakage or spillage. In some cases, absorbent materials were placed on the floor to absorb leaked or spilled material. Otherwise, leakage or spillage would be handled by absorption and decontamination (i.e., flushing, neutralizing).

Quantities of missile fueling liquids stored were limited to those needed to service two or three missiles. Fuels for vehicles were stored in aboveground and underground tanks. No leak checking was conducted, and spillage during fuel transfers was reportedly frequent.

Waste materials (solvents, fuels, UDMH, IRFNA) were drummed and stored in a bermed building or storage area for pick-up by property disposal personnel.

The quantities of waste materials in storage at any one time were generally small. Information indicates that leakage or spillage in the storage areas was uncommon and involved very small quantities. Overall, potential for ground contamination from storage areas appears to be small.

6.1.3 CONVERSION/DEACTIVATION

Beginning in the late 1950s, deactivation and/or conversion of batteries from Ajax to the Hercules system were initiated under the direction of the missile battalions. A number of batteries remained as Ajax or were only partially converted to Hercules. In general, deactivation was a reversal of the deployment process in terms of material handling and disposition. Ajax hardware was shipped to depot-level supply points, while expendable items that could be used with Hercules were retained at converted sites. At deactivated sites, both equipment and supplies were returned to depot-supply.

The deactivation and disposition of the missile and launcher were generally a reversal of the initial assembly/activation process. The missile and launcher were purged of fuel, UDMH or aniline, IRFNA, and hydraulic fluid using normal defueling procedures. Wastes were either recontained for property turn-in or disposed of in onsite ground sumps or onsite spectic systems. Missiles were disassembled and recontainerized.

It was also frequently necessary during a conversion or deactivation process to dispose of fuels and other chemicals in excess of recorded inventory. This material was generally dumped onsite in a ground sump or on the surface. Some instances were reported where excess material was transported offsite and dumped in open areas nearby, and limited instances of full UDMH containers being found buried at old Nike sites have been documented. All fresh fuels and other chemicals were typically turned in to depot supply. All magazine hardware was retained for subsequent disposition or conversion. Elevators remained functional.

Some equipment alterations were required for the conversion from the Ajax to the Hercules system. Some magazines needed to be enlarged (width) to contain the larger Hercules missiles. The launcher and missile systems were larger and heavier, requiring a higher-capacity lift system. The launcher and rail systems were also replaced. Any alteration or replacement of existing structures would represent limited potential for contaminant generation, although some POL products and hydraulic fluids would have been wasted during replacement or alteration and probably disposed of onsite.

After battery personnel departed the battery site, physical closure or subsequent maintenance was the responsibility of the U.S. Army Corps of Engineers (COE).

Prior to reporting any property eligible for excess, COE personnel generally conducted an inspection and survey of the property, and secured the property until subsequent disposition. Typically, the inspection or survey would consider aspects of safety and contamination, as well as securing the site from public access.

6.2 HERCULES

For the most part, the life cycle features of a typical Hercules battery varied little from those of the Ajax system. In most cases, Hercules missiles were deployed at existing Ajax battery locations. Other features of deployment and deactivation/site closure were essentially similar to those for Ajax, although there were some operational differences. The following discussion will detail only those aspects of the Hercules life cycle different from the Ajax life cycle. It must be noted that, at some batteries, both Hercules and Ajax were deployed at a site for at least some period of time.

6.2.1 DEPLOYMENT

Site preparation was necessary only at those sites where the deployment was new, rather than at a conversion site. New site preparation was essentially similar to that detailed for Ajax.

New construction at converted sites included alteration of storage facilities; some expansion of missile assembly, warheading, and repair buildings; and changes in the rail transport and missile lift assemblies.

Assembly and testing of Hercules were similar to Ajax; the only exception was the use of solid fuel in Hercules, thus eliminating the liquid fueling procedures. The solid fuel was a cast propellant, with the grain being an integral part of the motor, eliminating the need for fuel handling.

6.2.2 OPERATION

The major operational changes involved the solid fuel system adopted for the Hercules. This eliminated the UDMH, aniline, IRFNA, and JP-4 from the operations and greatly reduced routine maintenance requirements. This also reduced the variety and quantity of fresh and waste liquids handled at the site. Support equipment maintenance/repair operations for Hercules were similar to those of the Ajax system and involved the use of solvents and cleaning agents. The use of carbon tetrachloride and trichloroethylene was gradually phased out during Hercules, and PD-680 or Stoddard II solvents were introduced. Reportedly, the extent of solvent use depended somewhat on particular tasks performed at the battery, which, in turn, depended on the expertise of personnel assigned to the site.

Early models of the Hercules used ethylene oxide to power control surfaces. This material was generally drained into containers for turn-in or into a ground sump. Early Hercules also used three liquid electrolyte batteries per missile. These were changed-out monthly, the waste acid sent to ground sumps, latrines, or to neutralizing drums for turn-in. The liquid-electrolyte batteries were later replaced by nickel-cadmium batteries, which did not involve any fluid changing. These were replaced monthly; the old batteries were turned in to property disposal personnel for disposition.

There appear to be no significant regional differences in the operational aspects of the Hercules system. Variability was primarily due to battery-to-battery differences, as was the case with the Ajax system.

Storage of materials at the typical Hercules battery was similar to storage at Ajax batteries. There was some indication that onsite storage of waste POL, solvents, and paints may have increased in the years after 1965 due to increased awareness of potential problems related to onsite dumping.

6.2.3 CONVERSION/DEACTIVATION

The Hercules was the final system deployed under the Nike program. As a result, the final phase of the Hercules life cycle was one of deactivation and site closure. Essentially, the deactivation/closure process was identical to that of Ajax sites not converted to Hercules and largely consisted of equipment inactivation and turn-in. Missiles were disassembled and containerized for shipment. All launcher and magazine hardware was removed, generally excluding the elevator systems. Containerized wastes and fresh materials were turned into depot supply. Excess inventories were typically disposed of onsite, generally into a ground sump. All launch control, radar, and support equipment was turned in for disposition.

Site closure was primarily the responsibility of the appropriate COE district and may or may not have involved a closure survey of contamination and safety aspects. The battery sites were at least physically secured from unauthorized entry. Final closure was largely dependent upon subsequent usage (leasing, excessing, etc.). App. F provides a listing of sites and their property disposition after closure. No record was found of any routine site decontamination or of any formal procedure for well capping or magazine closure. Some site cleanups have been conducted on a case-by-case basis in response to specific problems or complaints.

7.0 ENVIRONMENTAL RELEASES

The materials potentially released to the environment at Nike sites, their quantities, and their sources are summarized in Table 7.0-1. Materials, use areas, and disposal methods were confirmed by at least two independent sources. Quantities used and dates reflect the best possible estimate based on reports which were in some cases widely variable. Some quantity estimates (e.g., diesel and gasoline consumption) were derived from related information, such as the number of personnel, vehicles, and generators associated with a battery. The quantities listed in Table 7.0-1 are the annual usage rates and represent the maximum potential release to the environment and not the quantities actually disposed of onsite. The behavior and persistence of those materials listed in Table 7.0-1 are discussed in this section.

7.1 CHLORINATED ORGANIC SOLVENTS

Between the early 1950s and the mid-1970s, a variety of chlorinated organic solvents were utilized on Nike sites for cleaning and maintenance activities. At many of the early Ajax sites carbon tetrachloride was used as a multi-purpose solvent. Carbon tetrachloride was gradually replaced, in turn, by trichloroethylene and trichloroethane.

As shown by the data in Table 7.1-1, carbon tetrachloride, trichloroethylene, and trichloroethane are nonreactive compounds in the environment. The solvents are not subject to photolytic, oxidative, hydrolytic, or biologic reactions to a significant degree.

The volatility of the compounds is such that a portion of the solvent would have evaporated during use, reducing the amount that might have been disposed of on the site itself. The volatility of these solvents also precludes any residual contamination of surface waters, except where contaminated ground water might be contributing to surface water flows.

Table 7.0-1. Summary of Environmental Releases at a Nike Missile Battery

Contaminant	Quantity Used (l/year)	Area of Use*	Routine Disposal Methods Primary	Routine Disposal Methods Secondary	Incidental Releases	Dates
Carbon Tetrachloride	1,000- 2,000	LA, Motor Pool	Sump	Surface Dump	--	1954-1962
Trichloroethylene	360- 1,400	LA, Motor Pool	Sump	Surface Dump	--	1956-1970
Trichloroethane	1,000- 2,000	LA, Motor Pool	Sump	Surface Dump	--	1958-1974
IRFNA**	500- 1,500	Fuel/Defuel	Sump	Turn-in	Line Rupture	1954-1964
Aniline-Furfuryl Alcohol**	20- 30	Fuel/Defuel	Turn-in	Dump/Burial	Line Rupture	1954-1958
UDMH**	20- 30	Fuel/Defuel	Turn-in	Dump/Burial	Line Rupture	1956-1964
Battery Electrolyte	100- 300	LA, Motor Pool	Sump	Sewer	--	1954-1978
JP-4**	2,000- 3,000	Fuel/Defuel	Turn-in	--	Leakage	1954-1978
Diesel/Gasoline	50,000-100,000	Motor Pool, Generator	Consumptive Use		Leakage	1954-1978
Stoddard Type II	2,000- 4,000	LA, Motor Pool	Sump	Turn-in	--	1965-1978
No. 2 Fuel Oil	20,000- 50,000	LA, BCA, Housing	Consumptive Use		Leakage	1954-1978
Motor Oil	400- 600	Motor Pool	Turn-in	Sump	--	1954-1978
Hydraulic Fluid	1,900- 3,780	LA, Motor Pool	Sump	--	Line Rupture	1954-1978

* LA = Launch Area
BCA = Battery Control Area
** Ajax Only

Source: ESE, 1983.

ORIGINAL Page

Table 7.1-1. Physical and Transport Data for Chlorinated Organic Solvents

Property	Carbon Tetrachloride	Trichloroethylene	1,1,1-Trichloroethane	1,1,2-Trichloroethane
Molecular weight	153.82	131.39	133.41	133.41
Melting point, (^{o}C)	-22.99	-73	-30.41	-36.5
Boiling point, (^{o}C)	76.54	87	74.1	113.77
Ionization constant	NA*	NA	NA	NA
Water solubility (mg/l)	785 (20 ^{o}C)	1100 (20 ^{o}C)	720 (25 ^{o}C)	4500 (20 ^{o}C)
Octanol-water partition constant (K_{ow})	912	69	320	117
Sediment-water partition constant (K_{oc})	439	33	152	56
Henry's constant (atm m^3 mol^{-1})	0.023	0.0091	0.03	7.42×10^{-4}
Vapor pressure (torr)	90 (20 ^{o}C)	57.9 (20 ^{o}C)	123 (25 ^{o}C)	19 (20 ^{o}C)
Photolysis rate constant (hr^{-1})	NA	NA	NA	NA
Oxidation rate constant ($mole^{-1}$ hr^{-1})	<<360	$<10^3$	<<360	<<360
Hydrolysis rate constant (hr^{-1})	NA	0	1.7×10^{-4} (neutral, 25 ^{o}C)	1.2×10^{-7}
Biotransformation rate constant (ml $cell^{-1}hr^{-1}$)	1×10^{-10}	1×10^{-10}	NA	3×10^{-12}

Source: Mabey *et al.*, 1981.

*NA - Not Appreciable. While actual values were not provided in the source literature, these rates and constants are either 0 or so low that the associated transformation processes are inconsequential in the environment.

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The sediment-water partition constants (K_{oc}, Table 7.1-1) indicate that solvents poured onto the ground would experience some retardation relative to percolating water due to adsorption by soil organic matter. Since the extent of sorption is related to the organic carbon content of soils by the K_{oc}, the degree of sorption will vary from one soil to another, with sandy soils sorbing less than more organic soils. Temporary immobilization in the upper layers of the soil provides further opportunity for volatilization prior to incorporation into ground water.

The lack of hydrolytic reactivity and the tendency to be sorbed suggest that once introduced into ground water, the chlorinated solvents could be persistent, particularly in those instances where ground water movement is slow.

Presented in Table 7.1-2 is a summary of U.S. Environmental Protection Agency (EPA) criteria for chlorinated solvents and other parameters associated with Nike wastes. These criteria are recommended for the protection of human health and for maintenance of a healthy, freshwater aquatic ecosystem. National Interim Primary Drinking Water Regulation (NIPDWR) standards are included when applicable. The aquatic life criteria listed reflect levels of acute toxicity to typical, but not necessarily the most sensitive, aquatic organisms. The human health criteria cited are levels at which an incremental increase of 10^{-5} in cancer risk may result over a lifetime due to consumption of contaminated water or organisms inhabiting the water. The criteria in Table 7.1-2 do not apply to ground water, except where they serve as a drinking water supply. Ground water does, however, become subject to surface water criteria when it surfaces as seeps, springs, or otherwise becomes incorporated in surface water.

7.2 HYDROCARBONS

A variety of hydrocarbon products were utilized or stored on Nike batteries, including JP-4, diesel fuel, gasoline, fuel oil, hydraulic fluid, and motor oil. Each of these products consists of a large number of components

Table 7.1-2. Current EPA Water Quality Standards/Criteria for Selected Contaminants

Parameter	Maximum Drinking Water Contaminant Level (ug/l)	Freshwater Aquatic Life*		Human Health*	
		24-Hour Average (ug/l)	Maximum Level (ug/l)	Ingesting Water & Organisms (ug/l)	Ingesting Organisms Only (ug/l)
Lead	50	20.0	400	50	--
1,1,1-Trichloroethane	--	--	31,200	18,400	1×10^6
1,1,2-Trichloroethane	--	--	--	6	418
Trichloroethylene	--	--	45,000	27	807
Carbon Tetrachloride	--	--	35,200	4.0	69.4
Nitrate (as N)	10 mg/l	--	--	--	--

*Criteria for 10^{-5} incremental increase of cancer risk (one additonal case of cancer in populations of 100,000).

Source: EPA 1980, 1981

(individual compounds and isomers), discussed in aggregate due to their similar properties.

Once released either on or under ground, petroleum products, attenuated somewhat by sorption on soil, move downward until either a restrictive horizon or the water table is intercepted. The portion that reaches the ground water is partitioned into (1) a free product that forms on top of the water and spreads laterally, and (2) a dissolved or emulsified product in the aquifer (Yaniga, 1982). The amount of hydrocarbon dissolving in the water is small and depends in large part on the type of petroleum product. Typical saturation concentrations are 0.1 to 5 milligrams per liter (mg/l) for kerosene and petroleum, 10 to 50 mg/l for diesel oil and extra light heating oil, and 50 to 500 mg/l for gasoline (Matthess, 1982). The products tend to be persistent, particularly in ground water where photolysis and evaporation are not major processes.

Petroleum products in ground water are objectionable primarily because of odor and taste (organoleptic) problems. The odor and taste thresholds of petroleum products vary from about 0.001 mg/l (gasoline, diesel fuel, heating oil) to about 10 mg/l (benzole) (Matthess, 1982) and are less than toxic concentrations. At toxic levels, the contaminated water is unpalatable. Consequently, EPA has not established quantitative water quality criteria for petroleum hydrocarbons for the protection of human heath, since organoleptic constraints would preclude the ingestion of water contaminated to toxic levels. Other problems may also be associated with petroleum-contaminated water, including fire and explosive hazards.

7.3 IRFNA

IRFNA consists of nitrogen dioxide dissolved in nitric acid. IRFNA is a powerful oxidizing agent and a strong acid and is, therefore, very reactive in the environment. Virtually all reactions, including neutralization of spilled or excess IRFNA, result in nitrate anions.

Water containing large quantities (greater than 100 mg/l) of nitrate is bitter tasting and may cause physiological stress. The NIPDWR standard for nitrate in drinking water is 10 mg/l.

7.4 UDMH

UDMH, used in small quantities as a starter fluid in later Ajax missiles, is a powerful reducing agent with a melting point of -58 degrees Celsius (^{o}C) and a boiling point of 63.9^{o}C. UDMH in the environment undergoes both hydrolysis and oxidation.

In a series of soil stability studies (ESE, 1982) it was found that less than 10 percent of the UDMH spiked onto a soil sample could be recovered after 1 hour. Recognizing that UDMH is volatile, a second experiment was run using capped containers to eliminate loss due to volatilization. Under these circumstances the half-life of UDMH on moist soil was found to be less than 1 hour. The study concluded that UDMH is not persistent in moist soil.

7.5 ANILINE--FURFURYL ALCOHOL

Aniline was burned with furfuryl alcohol as a starter fuel in the very early years of the Ajax program in the second-stage starter fluid, and the small quantities disposed of were poured on the ground.

Aniline has a melting point of -6°C, a boiling point of 184°C, and a water solubility of 3,700 mg/l. While environmental fate data were not located for aniline, data for benzidine (EPA, 1981), a similar compound, suggest that aniline is not a persistent compound. Both oxidation and photolysis contribute to its transformation. In addition, benzidine is strongly sorbed onto clays and is not significantly bioaccumulated.

Furfuryl alcohol is very soluble in water and has a low volatility (vapor pressure = one torr at 31°C). It behaves as a primary alcohol, undergoing

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oxidation and acid hydrolysis. While moderately stable and moderately toxic (LD_{50} = 275 mg/kg in rats), the small quantity of furfuryl alcohol that was discarded and its high solubility suggest that it would not be present in the environment in significant concentrations.

7.6 BATTERY ELECTROLYTE

The disposal of lead battery electrolyte, often accompanied by acid neutralization, resulted in the release of lead to soils and potentially to surface water and ground water. Normally lead is immobilized in soil, its very low solubility restricting downward movement into ground water (Brady, 1974). The disposal of large quantities of unneutralized electrolyte at the same location each month would enhance the possibility of contaminating ground water.

7.7 RADIOACTIVE MATERIALS

The maintenance of Nike Hercules nuclear warheads required periodic wipe tests to establish the absence of radioactive leaks. The wipes were disposed of in facilities licensed by the U.S. Atomic Energy Commission (AEC). Often these facilities consisted of a lead-lined drum kept in a secure location. Defective electron tubes containing radioactive isotopes were also kept in these drums. The storage facilities were monitored for radioactivity in compliance with the terms of the AEC license. At the time of deactivation the storage facilities were reportedly closed and removed in accordance with AEC requirements. No instances of release of radioactive materials into the environment were reported.

7.8 RESIDUAL CONTAMINATION

Considering the quantities of waste materials released at Nike sites and the environmental properties of these materials, the potential for contaminants to still be present in the environment in significant concentrations is limited to only a few substances. At both Ajax and Hercules sites the use and disposal of chlorinated organic solvents, various hydrocarbon products, and battery electrolyte introduced persistent contaminants into the environment. In addition, nitric acid was disposed of on Nike Ajax

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sites. The potential for such contaminants to have persisted to this time in undesirable concentrations varies greatly from site to site. The actual quantities released, method of disposal used, properties of soils, nature of the ground water system, utilization of ground water and soil systems, and general environmental conditions combine to mitigate or exacerbate any materials released at any given site.

Whether or not the contaminants were containerized at the time of disposal is particularly significant. Burial of materials in containers presents the possibility of environmental release at a later time when the container corrodes or breaks. In such cases the extent of existing contamination may be greater than what would have been expected, given the time that has elapsed since the Nike system was deactivated.

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8.0 CONCLUSIONS

1. The Nike missile system in CONUS began with deployment of the Nike Ajax missile in 1954. Deployment of the Nike Hercules began in 1958, completely replacing the Nike Ajax by 1964. In 1974, the Nike Hercules was withdrawn from service as an anti-aircraft weapon in CONUS. Nike Zeus was developed and tested from 1956 to 1962, but was never deployed.

2. Nike missile sites were primarily located in the vicinity of major metropolitan areas and strategic military installations.

3. The Nike Ajax used only high explosive warheads. The Hercules missles used primarily nuclear warheads, but were capable of being fitted with high explosive warheads.

4. Among the substances used or stored on Nike sites were liquid missile fuel (JP-4); starter fluids (UDMH, aniline, and furfuryl alcohol); oxidizer (IRFNA); hydrocarbons (motor oil, hydraulic fluid, diesel fuel, gasoline, heating oil); solvents (carbon tetrachloride, trichloroethylene, trichloroethane, stoddard solvent); and battery electrolyte.

5. In general, the missile fuels and oxidizers were carefully controlled. Releases to the environment were confined to IRFNA and very small quantities of the other liquids. With the close of the Nike Ajax system in 1964, the use of liquid fuels was discontinued.

6. The quantities of materials disposed of and procedures for disposal are not documented in published reports. Virtually all information concerning the potential for contamination at Nike sites is confined to personnel who were assigned to Nike sites.

7. There appeared to be no systematic regional variation in procedures or disposal practices. Variations in procedures and disposal did result

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from battalion-specific practices and adaptations to permafrost conditions.

8. Most Nike sites were equipped with sumps for disposing of liquid wastes. Any liquid disposed of in such sumps was allowed to soak into the ground. Alternatively, temporary storage and offsite disposal were used to handle liquid waste at some sites.

9. Of the materials disposed of at Nike sites, chlorinated organic solvents present the highest potential for residual contamination. At some sites the possibility of hydrocarbon, lead, or nitrate contamination may exist.

10. During deactivation most hardware was shipped to depot-level supply points. There were reportedly instances where excess materials were disposed of on or near the site itself at closure. There was reportedly no routine site decontamination.

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APPENDIX A

ADDITIONAL SOURCES CONSULTED

ORIGINAL (Red)

APPENDIX A

ADDITIONAL SOURCES CONSULTED

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APPENDIX B

LOCATIONS OF FORMER NIKE MISSILE SITES

APPENDIX B

LOCATIONS OF FORMER NIKE MISSILE SITES

Appendix B consists of two tables and a series of maps which can be used, individually or in conjunction with each other, to identify the locations of former Nike missile sites.

Appendix B-1 is a table of Nike missile locations compiled from information provided by Real Property Offices of the U.S. Army Corps of Engineers (CE). The table is organized by state and provides the CE site designation, location (as indicated in the CE records), and comments regarding whether or not the site is still Army real property (ARP). Where provided by CE, dates of excessing are given for sites that are not Army real property (NARP).

Appendix B-2 is a listing of Nike sites showing responsible units, periods of activity, and locations. This table was compiled from historical records obtained from the Military History Institute, Carlisle Barracks, Pa. for the years 1954 through 1974. The dates of operation and locations at which each military unit operated a Nike site were determined by reviewing individual annual listings. The letters AC in the Hercules closing date column indicate an active status as of the last year of record (1974). The remarks column gives additional locations at which the particular battery was listed, and the date such listing appeared. In some cases, these additional locations may represent a physical relocation of battery personnel. In most instances, they appear to represent alternative names for the same site.

While some Nike sites can be unambiguously located in both Appendix B-1 and Appendix B-2, this is often not possible. For example, Appendix B-2 uses town/county location names for the Pennsylvania sites that can not be readily correlated with the sites that Appendix B-1 lists as being in Philadelphia. This inconsistency is inherent in the source documents and can not be readily resolved. Despite the inability to completely correlate the information in Appendix B-1 with the information in Appendix B-2, each provides useful information not found in the other. The nature of the sources for both tables is such that the listings of Nike sites may be incomplete.

The maps presented in Appendix B-3 show the locations of ARADCOM sites in CONUS as of 1968 and give certain information about the unit and equipment at each site. The top line in each box gives the CE designation for the property, such as LA-04. The second line is a military unit designation (for example, A/4/65 to indicate A Battery, 4th Battalion, 65th Artillery). Other items in the boxes describe certain equipment at the site, such as HIPAR for high-power acquisition radar, and HAWK for a Hawk missile battery. The other codes have not been identified. These maps were included in an annual historical summary report produced in 1968 and obtained from the NORAD History Office in Colorado Springs, Colo. Similar maps could not be located for other years.

APPENDIX B-1
LOCATIONS OF NIKE MISSILE SITES
IDENTIFIED BY THE U.S. ARMY CORPS OF ENGINEERS

State	Designation	Location	Comments
Alaska	02-701	Fairbanks	NARP
	02-714	Fairbanks	ARP
	02-709	Fairbanks	ARP (CE)
	02-731	Fairbanks	ARP (CE)
	02-711	Fairbanks	ARP (in pool for Native Corp.)
	02-725	Anchorage	NARP
	02-695	Anchorage	NARP
California	LA 04	Mt. Gleason	NARP
	LA 09	Mt. Disappointment	NARP
	LA 14	Whittier Narrows	NARP
	LA 29	Brea	NARP
	LA 32	Los Alamitos	NARP
	LA 40	Lakewood	NARP
	LA 43	Ft. MacArthur	*
	LA 55	Point Vicente	NARP
	LA 57	Redondo Beach	*
	LA 70	Playa Del Rey	*
	LA 73	Playa Del Rey	*
	LA 78	Santa Monica Mtns.	NARP
	LA 88	Oak Mtn.	NARP
	LA 94	Los Pinetos Mtn.	*
	LA 95	Los Angeles Area	NARP
	LA 96	Metro LA Area	NARP
	LA 98	Van Nuys (Magic Mtn.)	NARP
		Balsa Chica	NARP
	SF 25	Oakland	NARP excessed 1964
	SF 31	Oakland	NARP excessed 1975
	SF 37	Alvarado	NARP excessed 1963
	SF 51	Rockaway Beach	NARP excessed 1979
	SF 59	San Francisco	NARP excessed 1972
	SF 87	Ft. Barry	*
	SF 88	Ft. Cronkhite	*
	SF 89	San Francisco	NARP excessed 1963
	SF 91	San Francisco	NARP excessed 1963
	SF 93	San Rafael	NARP excessed 1972
	Site 61-R	San Francisco	NARP excessed 1961
	AAA Batt 12	Berkeley	NARP excessed 1959
	SF 08-09	Berkeley	NARP excessed 1972
	T 53	Fairfield	NARP
	T 10	Elmira	ARP
	T 33	Vocaville	NARP
	T 86	Fairfield	NARP (19 ha), ARP (28 ha leased)

NARP
1st Army
Special
Projects

APPENDIX B-1
LOCATIONS OF NIKE MISSILE SITES
IDENTIFIED BY THE U.S. ARMY CORPS OF ENGINEERS

State	Designation	Location	Comments
Connecticut	BR 04	Ansonia	*
	BR 15	New Haven	NARP
	BR 17	Bridgeport	NARP
	BR 65	Bridgeport	NARP
	BR 73	Westport	NARP
	BR 94	Monroe	NARP
	HA 08	East Windsor	*
	HA 25	Hartford	NARP
	HA 36	Portland	NARP
	HA 48	Cromwell	NARP
	HA 67	Plainville	NARP
	HA 85	Simsbury	NARP
Florida	12005	Richmond AFB	NARP trans to USAF
	12150	Broward Co.	1 parcel ARP, 1 parcel NARP
	12159	Dade Co.	NARP - sold by GSA
	12164	Dade Co.	NARP - sold by GSA
	12165	Monroe Co.	NARP - transferred to Navy
	12170	Dade Co.	NARP - sold by GSA
	12180	Dade Co.	NARP - transferred to Nat'l. Park Svc.
	12190	Dade Co.	NARP - sold by GSA
	12195	Miami	ARP(permitted to INS refuge)
	12199	Monroe Co.	NARP - transferred to Navy
	12201	Monroe Co.	NARP - transferred to Navy
	12205	Monroe Co.	NARP - transferred to Navy
	12209	Monroe Co.	NARP - transferred to Navy
	12010	Monroe Co.	NARP - transferred to Navy
Georgia	TU 79	Albany	NARP
	R 128	Jeffersonville	NARP
	R 88	Byron	NARP
	TU 28	Sylvester	NARP
Hawaii	Site 1	Waialua, Oahu	NARP
	Site 2	Kahuku, Oahu	ARP
	Site 3 & 4	Hawaii Kai, Oahu	NARP
	Site 5 & 6	Makakilo, Oahu	ARP Excessed to GSA on 6 June 79
Idaho	05	Mountain Home AFB	NARP
	79	Mountain Home AFB	NARP

APPENDIX B-1
LOCATIONS OF NIKE MISSILE SITES
IDENTIFIED BY THE U.S. ARMY CORPS OF ENGINEERS

State	Designation	Location	Comments
Illinois	C 40	Chicago	NARP
	C 03	Chicago	NARP
	C 44	Chicago	NARP
	C 80	Arlington	(ARP (USAR Center)
	C 41	Chicago	NARP
	C 47	Porter	NARP
	C 49	Homewood	*
	C 51	Alsip	NARP (3.0 ha leased ARP)
	C 54	Orland Park	*
	C 61	DuPage Co.	ARP (leased)
	C 70	Naperville	NARP
	C 72	Addison	*
	C 80	Arlington Hts.	*
	C 84	Palatine	NARP
	C 93	Northfield	NARP
	C 92-94	Libertyville	NARP
	C 98	Ft. Sheridan	*
	SL 90	Grafton	NARP
	SL 40	Monroe Co.	NARP
	SL 10	Madison, CO	NARP
Indiana	C 48	Gary	NARP
	C 45	Gary	NARP
	C 46	Munster	NARP
	C 32	Porter Co.	NARP
	CD 63	Dearborn	NARP
Iowa	10	Council Bluffs	NARP
Kansas	KC 80	Leavenworth Co.	NARP 3/26/58-3/21/73
	KC 60	Johnson Co.	NARP 3/26/58-7/29/69
	KC HQ	Olathe	NARP 9/17/58-4/1/69
	SC 01	Ottawa	NARP 3/10/59-2/2/62
	SC 50	Saline Co.	NARP 3/10/59-2/2/62
Louisiana	BD 10	Bellevue	1960-1967
	BD 50	Stonewall	1960-1967
Maine	LO 13	Caswell	NARP
	LO 31	Linestone	NARP
	LO 58	Presque Isle	NARP
	LO 85	Connor	NARP

116

ORIGINAL (Red)

APPENDIX B-1
LOCATIONS OF NIKE MISSILE SITES
IDENTIFIED BY THE U.S. ARMY CORPS OF ENGINEERS

State	Designation	Location	Comments
Maryland	W 54	Pomonkey	NARP to Navy
	BA 03	Phoenix	37 ac. to Balt Co., 1976
	BA 09	Fork	Declared Excess
	W 25	Davidsonville	NARP
	W 26	Annapolis	NARP deeded to Navy
	BA 30,31	Chestertown	NARP deeded to Kent Co.
	W 45	Waldorf	NARP to Navy
	W 34	Suitland	NARP trans. to Smithsonian Institute
	W 35	Croom	*
	W 44	Waldorf	Declared Excess
	BA 79	Granite	NARP to GSA and State
	W 92	Rockville	NARP to GSA
	W 93	Fed. Regional Ctr.	NARP
	W 94	Laytonsville	NARP to Navy & private
	BA 92	Baltimore	NARP to GSA and USAR
	BA 43	Anne Arundel Co.	NARP
	W 36	Brandywine	NARP
	BA 18	Army Chem. Center	*
Mass.	B 03	Reading	NARP
	B 05	Danvers	NARP
	B 15	Beverly	NARP
	B 17	Nahant	NARP
	B 36	Weymouth	NARP
	B 37	Quincy	NARP
	B 38	Hingham	NARP
	B 63	Needham	NARP
	B 73	Lincoln	NARP
	B 84	Burlington	NARP
	B 85	Bedford	NARP
	PR 19	Rehoboth	NARP
	PR 29	Swansea	NARP
	B 55	Blue Hills	*
Michigan	D 15	Selfridge AFB	NARP
	D 17	St. Clair Co.	NARP
	D 06	Utica	NARP
	D 14	Macomb Co.	NARP
	D 16	Selfridge AFB	ARP (leased)

ORIGINAL (Red)

APPENDIX B-1
LOCATIONS OF NIKE MISSILE SITES
IDENTIFIED BY THE U.S. ARMY CORPS OF ENGINEERS

State	Designation	Location	Comments
Michigan (Cont)	D 23-26	Wayne Co.	NARP
	D 51	Wayne Co.	NARP
	D 54-55	Riverview	NARP
	D 57	Newport NAS	*
	D 69	Detroit	*
	D 61	Wayne Co.	NARP
	D 86	Oakland Co.	NARP
	D 87	Oakland Co.	NARP
	D 58	Carleton	ARP (approx. .56 ha to be disposed of)
	D 97	Auburn Hts.	*
Minnesota	MS 40	Framington	NARP
	MS 90	Bethel	NARP
	MS 70	Minneapolis	NARP
	MS 20	St. Paul	NARP
Missouri	KC 10	Ray Co.	NARP 3/26/58-7/29/69
	KC 30	Cass Co.	ARP 3/26/58-11/21/72
	SL 60	Pacific	NARP
Nebraska	LI 01	Lincoln	NARP
	LI 50	Crete	NARP
	OF 60	Plattsmouth	NARP
	OF 10	Plattsmouth	*
New Mexico	WA 10	Walker AFB	NARP excessed 1961
	WA 50	Walker AFB	NARP excessed 1962
New Jersey	NYD 80	Morristown	Declared Excess
	PH 58	Swedesboro	--
	NYD 60	S. Amboy	2AC ARP
	NYD 65	S. Plainfield	NARP
	NYD 54	Holmdel	NARP
	PH 41/43	Glassboro	Declared Excess
	NYD 93	Mahwah	Declared Excess
	PH 32	Marlton	NARP
	NYD 73	Summit	NARP
	NYD 88	Mt. View	NARP
	PH 23/25	Mt. Holly	NARP
	PH 49	Richwood	NARP

ORIGINAL (Red)

APPENDIX B-1
LOCATIONS OF NIKE MISSILE SITES
IDENTIFIED BY THE U.S. ARMY CORPS OF ENGINEERS

State	Designation	Location	Comments
New York	NYD 49	Ft. Tilden	*
	NYD 04/05	Orangetown	20 AC ARP remains
	NYD 25	Brookhaven	Some ARP remains
	NYD 99	Ramapo	NARP
	NYD 20	Huntington	NARP
	NYD 24	Babylon	NARP
	NYD 09	White Plains	NARP
	NYD 23	Oyster Bay	NARP
	NYD 30	Lido Beach	NARP
	NF 03	Lewiston -	NARP
	BU 09	Buffalo -	NARP
	NF 16	Cambria -	NARP
	BU 18	Lancaster -	NARP
	BU 34/35	Aurora	NARP
	NB, NF 41	Grand Island -	NARP
	BV 51/53	Hamburg -	NARP
	NY 56	Ft. Hancock	*
	NY 15	Ft. Slocum	*
Ohio	CD 46	Clermont Co.	ARP (3.6 ha leased, remainder NARP)
	CL 67	Cleveland	NARP
	CL 48	Cuyahoga Co.	NARP
	CL 69	Cuyahoga Co.	ARP (5.5 ha leased, remainder NARP)
	CL 13	Lake Co.	NARP
	CD 27	Wilmington	*
	CD 78	Oxford	*
	CL 02	Cleveland	*
	CL 11	Painsville	*
	CL 34	Cleveland	*
	CL 59	Parma	*
Pennsylvania	PI 02	Rural Ridge	NARP, to State, DOT
	PI 03	Indianda	Declared Excess
	PI 36	Irwin	NARP to GSA
	PI 25	Murrysville	*
	PI 37	Hermine	NARP sold 1976
	PI 43	Elrama	ARP
	PI 52	Hickman	*
	PI 62	Bryant	*
	PI 71	Corapolis	NARP
	PI 92	Allegheny Co.	USARC
	PI 93	Allegheny Co.	USARC
	PH 07	Northampton	NARP

ORIGINAL (Red)

APPENDIX B-1
LOCATIONS OF NIKE MISSILE SITES
IDENTIFIED BY THE U.S. ARMY CORPS OF ENGINEERS

State	Designation	Location	Comments
Pennsylvania (Cont)	PH 15	Bristol	USARC
	PH 67	Upper Chichester	NARP
	PH 75/78	Edgemont	USARC
	PH 82	Chester Co.	NARP
	PH 91	Montgomery Co.	NARP
	PH 97/99	Warrington	USARC
Rhode Island	PR 99	N. Smithfield	NARP
	PR 38	Bristol	NARP
	PR 58	N. Kingston	NARP
	PR 69	Coventry	NARP
	PR 79	Foster	NARP
South Dakota	EE 40	Ellsworth AFB	NARP
	E 20	Ellsworth AFB	NARP
	E 40	Ellsworth AFB	NARP
	D 70	Ellsworth AFB	NARP
Texas	BG 40	Elroy	1959-1981
	BG 80	Austin	1959
	DFWDA	Duncanville	
	DF 1	Denton	
	DF 50	Alvarado	1958-1973
	DF 20	Terrell	1958-1971
	DY-10	Abilene	1960-1968
	DY-50	Abilene	1960-1968
	DF 70	Ft. Walters	Mineral Wells
Virginia	W 83	Herndon	*
	W 64	Lorton	NARP
	W 74	Fairfax	Declared Excess
	N 36	Virginia Beach	NARP - GSA
	N 63	Suffolk	NARP
	N 93	Hampton	USARC
	N 02	Hampton	
	N 58	Chesapeake	
	W 75	Isle of Wright Co.	
	N 85	Newport News	
	N 52	Norfolk	
	N 25	Ft. Story	*
	N 75	Smithfield	*

ORIGINAL (Red)

APPENDIX B-1
LOCATIONS OF NIKE MISSILE SITES
IDENTIFIED BY THE U.S. ARMY CORPS OF ENGINEERS

State	Designation	Location	Comments
Washington	F 07	Spokane	ARP (12 ha leased, remainder NARP)
	F 37	Spokane	ARP (leased)
	F 45	Spokane	NARP
	F 87	Spokane	NARP
	S 03	Seattle	ARP (17 ha leased, remainder NARP)
	S 13-14	Redmond	ARP (12 ha leased, remainder NARP)
	S 20	Seattle	NARP
	S 32-33	Seattle	NARP
	S 43	Midway	NARP (10 ha ARP)
	S 61	Vashon	NARP
	S 62	Bremerton	NARP
	S 81	Poulsbo	NARP
	S 82	Winslow	NARP (2 ha ARP)
	S 92	Kingston	NARP
	H 06	Saddle Mt.	*
	H 12	Othello	*
	H 52	Rattlesnake Mt.	*
	H 83	Priest Rapids	*
Wisconsin	M 02	River Hills	NARP
	M 20	Milwaukee	NARP
	M 42	Cudahy	NARP
	M 54	Milwaukee	NARP
	M 64	Muskego	NARP
	M 74	Muskego	NARP
	M 86	Menomonee Falls	NARP
	M 96	Milwaukee	ARP (leased)

(9A)

SOURCE: CE Real Property Records

* Site not included in CE records. Information from secondary sources.
NARP = Not Army Real Property
ARP = Army Real Property

Appendix B-2. Nike Missile Sites

Unit	Battery	Ajax		Hercules		Location	Remarks
5th Arty/3rd Btn (24th Btn)	HQ	1955	1958	1959	AC	Fort Banks, Mass.	Rehoboth (1964); Coventry, R.I. (197
	A	1955	1958	1959	1969	Nahaut, Mass.	Lincoln (1957); Windsor, Conn. (1966
	B	1955	1958	1959	1964	Reading, Mass.	Bedford (1957); Fort Duvall (1962)
	C	1955	1958	1959	AC	Bluehill, Mass.	Burlington (1957); Bristol, R.I. (1963)
	D	1955	1958	1959	AC	Needham, Mass.	Danvers (1957)
52nd Arty/3rd Btn (514th Btn)	HQ	1955	1958	1959	1962	Quincy, Mass.	
	A	1955	1958	1959	1962	Lincoln, Mass.	Bingham (1957)
	B	1955	1958	1959	1962	Burlington, Mass.	Blue Hill (1956); Burlington (1958); Nahant (1960)
	C	1955	1958	1959	1962	Quincy, Mass.	
	D	1955	1958	1959	1962	Fort Duvall, Mass.	
57th Arty/1st Btn (605th Btn)	HQ	1956	1960	--	--	Fort Devens, Mass.	
	A	1957	1960	--	--	Beverly, Mass.	
	B	1956	1960	--	--	Danvers, Mass.	
	C	1956	1959	--	--	Bingham, Mass.	
	D	1956	1960	--	--	Bedford, Mass.	Reading (1957)
56th Arty/4th Btn (739th Btn)	HQ	1956	1958	1959	1963	Rehoboth, Mass.	
	B	1956	1958	1959	1963	Swansea, Mass.	
	C	1956	1958	1959	1963	N. Smithfield, R.I.	Bristol (1961)
	D	1956	1958	1959	1963	Foster, R.I.	N. Smithfield (1962)
68th Arty/4th Btn (751st Btn)	HQ	1956	1959	1960	1962	Coventry, R.I.	
	A	1956	1959	1960	1962	N. Kingston, R.I.	
	C	1956	1959	1960	1962	N. Smithfield, R.I.	
	D	1956	1959	1960	1962	Foster, R.I.	

Unit	Battery	Ajax		Hercules		Location	Remarks
55th Arty/1st Btn (66th Btn)	HQ	1955	1960	--	--	Fort Totten, N.Y.	
	A	1955	1960	--	--	Orangeburg, N.Y.	Long Island (1958)
	B	1955	1960	--	--	☆ Kensico, N.Y.	
	C	1955	1960	--	--	Hicksville, N.Y.	
65th Arty/2nd Btn (483rd Btn)	HQ	1955	1958	1959	AC	Camp Kilmer, N.Y.	Van Nuys, Calif. (1973)
	A	1955	1958	1959	AC	Darlington, N.J.	Summit Watching (1958); Palmdale, Calif. (1973)
	B	1955	1958	1959	AC	S. Plainfield, N.J.	Malibu, Calif. (1973)
	C	1955	1958	1959	AC	Livingston, N.J.	Chatsworth, Calif. (1973)
	D	1955	1958	1959	1960	Lk. Pakanack, N.J.	
51st Arty/3rd Btn (505th Btn)	HQ	1955	1957	1958	1972	Fort Tilden, N.Y.	Fort Hancock, N.J. (1964); Highland, N.J. (1968)
	A	1956	1957	1958	1972	New York, N.Y.	Long Island (1957); Farmingdale (1963); S. Amboy, N.J. (1964); Fort Tilden (1963)
	B	1955	1957	1958	1964	New York, N.Y.	Fort Tilden (1963)
	C	1955	1957	1958	1972	Lido Beach, N.Y.	Fort Totten (1961); Fort Hancock (1964)
	D	1957	1957	1958	1970	Brookhaven, N.Y.	Holmdel, N.J. (1964)
71st Arty/4th Btn (526th Btn)	HQ	1955	1959	1960	1964	Fort Hancock, N.J.	
	A	1955	1959	1960	1964	S. Amboy, N.J.	
	B	1955	1959	1960	1964	Holmdel, N.J.	Leonard Chapel Hill (1957); S. Plainesville (1961)
	C	--	--	1962	1964	Fort Hancock, N.J.	
	D	1955	1959	1960	1964	Holmdel, N.J.	
7th Arty/5th Btn (737th Btn)	HQ	1956	1958	1959	1969	Fort Tilden, N.Y.	Tappan (1964)
	A	1957	1958	1959	1969	Orangeburg, N.Y.	Fort Tilden (1964, 1968); Orangeburg (1967)
	B	1957	1958	1959	1969	Darlington, N.J.	Franklin (1963, 1968); Darlington (1967)
	C	1957	1958	1959	1964	Spring Valley, N.Y.	Livingston, N.J. (1960)
	D	1957	1958	1959	1961	Holmdel, N.J.	Fort Hancock (1959); Fort Totten, N.Y. (1960)

Unit	Battery	Ajax		Hercules		Location	Remarks
43rd Arty/3rd Bn	HQ	--	--	1959	AC	Lumberton, N.J.	Pedricktown (1962, 1968); Edgemont (1964
	A	--	--	1962	AC	Lumberton, N.J.	Clementon (1963, 1969); Pedricktown (1967)
	B	--	--	1962	AC	Swedesboro, N.J.	
	C	--	--	1962	1967	Lumberton, N.J.	Edgemont (1965)
55th Arty/4th Btn	HQ	--	--	1965	1967	Fort Totten, N.Y.	
244th Arty/1st Btn (N.Y. ARNG)		1960	1963	1964	AC	New York, N.Y.	Listed as Pa. ARNG in 1966
245th Arty/1st Btn (N.Y. ARNG)		1960	1964	--	--	New York, N.Y.	
212th Arty/1st Btn (N.Y. ARNG)		1960	1964	--	--	New York, N.Y.	
254th Arty/1st Btn (N.Y. ARNG)		1960	1962	1963	1966	New York, N.Y.	Listed as active under N.J. ARNG in 1972-1973
3rd Arty/5th Btn (74th Btn)	HQ	1956	1959	1960	1963	West View, Pa.	
	A	--	--	1961	1963	West View, Pa.	
	B	--	--	1960	1963	Caraopolis, Pa.	
	C	--	--	1961	1963	Dorseyville, Pa.	
	D	--	--	1960	1963	Finleyville, Pa.	
59th Arty/2nd Btn (176th Btn)	HQ	1955	1958	1959	1965	Maple, Pa.	Edgemont (1964)
	A	1955	1958	1959	1965	Valley Forge, Pa.	Paoli (1967); Philadelphia (1961); Warrington (1963)
	B	1955	1958	1959	1965	Gradyville, Pa.	Edgemont (1957, 1964)
	C	1955	1958	1959	1964	Buckman, Pa.	Chester (1957)
	D	1955	1958	1959	1964	Pennsgrove, N.J.	Swedesboro (1957)

Unit	Battery	Ajax		Hercules		Location	Remarks
60th Arty/3rd Btn (506th Btn)	HQ	1956	1958	1959	1961	Philadelphia, Pa.	
	A	1956	1958	1959	1961	Philadelphia, Pa.	
	B	1956	1958	1959	1961	Philadelphia, Pa.	
	C	1956	1958	1959	1961	Philadelphia, Pa.	
	D	1956	1958	1959	1961	Philadelphia, Pa.	
166th Arty/2nd Btn (Pa. ARNG)		1960	1963	1964	1969	Philadelphia, Pa.	
166th Arty/3rd Btn (Pa. ARNG)		1960	1963	--	--	Philadelphia, Pa.	
254th Arty/2nd Btn (N.Y. ARNG)		1960	1963	--	--	Philadelphia, Pa.	
112th Arty/7th Btn (N.J. ARNG)		--	--	1967	1971	Philadelphia, Pa.	
1st Arty/3rd Btn (1st Btn)	HQ	1955	--	1960	AC	Fort Irwin, Pa.	Pittsburgh (1959); Oakdale (1972)
	B	--	--	1961	AC	Sewickley, Pa.	Fort Irwin (1963); Hermine (1968)
	C	--	--	1961	1969	N. Huntington, Pa.	Fort Irwin (1963)
	D	--	--	1960	AC	Elizabeth, Pa.	Fort Irwin (1963); El Rana (1968)
6th Arty/6th Btn (509th Btn)	HQ	1955	1958	1959	1960	Pittsburgh, Pa.	
	A	1955	1958	1959	1960	Corsopolis, Pa.	
	B	1955	1958	1959	1960	Bridgeville, Pa.	
	C	1955	1958	1959	1960	Finleyville, Pa.	
	D	1955	1958	1959	1960	Elizabeth, Pa.	
176th Arty/2nd Btn (Pa. ARNG)		1960	1963	1964	1973	Pittsburgh, Pa.	
176th Arty/1st Btn (Pa. ARNG)		1960	1963	--	--	Pittsburgh, Pa.	

ORIGINAL (Red)

Unit	Battery	Ajax		Hercules		Location	Remarks
(13th Btn)	HQ	1956	1960	--	--	Orland Park, Ill.	
	A	1956	1960	--	--	Naperville, Ill.	
	C	1956	1960	--	--	LaGrange, Ill.	
	D	1956	1960	--	--	Palatine, Ill.	
52nd Arty/4th Btn (49th Btn)	HQ	1956	1958	1959	1960	Chicago, Ill.	
	A	1956	1958	1959	1960	Wheeler, Ind.	Hammond (1957); Homewood, Ill. (1959)
	B	1956	1958	1959	1960	Chicago, Ill.	
	C	1956	1958	1959	1960	Libertyville, Ill.	Munster, Ind. (1957); Chicago (1959)
	D	1956	1958	1959	1960	Wheeler, Ind.	Hedgewick, Ill. (1957); Chicago, Ill. (195
517th Arty/1st Btn (78th Btn)	HQ	1955	1959	1960	1961	Fort Sheridan, Ill.	
	A	1956	1959	--	--	Libertyville, Ill.	
	B	1955	1959	--	--	Libertyville, Ill.	
	C	1958	1959	1960	1961	Fort Sheridan, Ill.	
	D	1956	1959	1960	1961	Arlington Hts., Ill.	Northfield (1959)
60th Arty/1st Btn (79th Btn)	HQ	1957	1958	1959	AC	Gary, Ind.	Munster (1969); Arlington Hts., Ill. (1971)
	A	1957	1958	1959	1971	Wheeler, Ind.	
	B	1957	1958	1959	AC	Chesterton, Ind.	Porter (1959, 1973)
	C	—	—	1960	1969	Gary, Ind.	Munster (1962)
	D	1957	1958	1959	1971	Gary, Ind.	Glen Park (1960); Chicago, Ill. (1965, 1968)
3rd Arty/6th Btn (86th Btn)	HQ	1955	--	--	--	Fort Sheridan, Ill.	
	A	1955	--	1962	--	Arlington Hts., Ill.	Homewood (1962); Chicago (1963)
	B	1955	--	1959	1965	Skokie, Ill.	Addison (1959)
	C	1955	--	1959	--	Argonne Laboratories, Ill.	Palatine (1959); Northfield (1961); Lemont (1962)
	D	1955	--	1963	--	Addison, Ill.	Northfield (1963)

Unit	Battery	Ajax		Hercules		Location	Remarks
57th Arty/2nd Btn	HQ	1955	--	--	--	Fort Sheridan, Ill.	
(485th Btn)	A	1955	--	--	--	Chicago, Ill.	Chicago (1962)
	B	1955	--	--	--	Chicago, Ill.	Northfield (1962)
	C	1955	--	--	--	Chicago, Ill.	
	D	1955	--	--	--	Hedgewick, Ill.	
59th Arty/3rd Btn	HQ	1956	1958	1959	1969	Prospect, Wis.	Milwaukee (1964)
(852nd Btn)	A	1956	1958	1959	1969	Prospect, Wis.	Milwaukee (1957)
	B	1956	1958	1959	1969	Waukesha, Wis.	Milwaukee (1957)
	C	1956	1958	1959	1969	Lannon, Wis.	Waukesha (1961); Chicago, Ill. (1965)
	D	1956	1958	1959	1969	Milwaukee, Wis.	Van Nuys, Calif. (1968)
60th Arty/2nd Btn	HQ	1959	1962	--	--	Orland Park, Ill.	
	A	1960	1962	--	--	Homewood, Ill.	
	C	1960	1962	--	--	Munster, Ind.	
	D	1959	1962	--	--	Lemont, Ill.	
562nd Arty/1st Btn	HQ	1955	1958	1959	1963	Fort George Meade, Md.	
(36th Btn)	A	--	--	1962	1963	Fort George Meade, Md.	
	B	--	--	1962	1963	Fort George Meade, Md.	
	D	--	--	1962	1963	Fort George Meade, Md.	
1st Arty/4th Btn	HQ	1955	1957	1958	AC	Edgewood Arsenal, Md.	
(54th Btn)	A	1955	1957	1958	AC	Granite, Md.	Sweet Air (1960); Gaithersburg (1968)
	B	1955	1957	1958	AC	Cromhardt, Md.	Granite (1960); }]idsonville (1968); Fort Story, Va. (1971)
	C	1955	1957	1958	AC	Edgewood Arsenal, Md.	Edgewood Arsenal (1973)
	D	1955	1957	1958	AC	Kingsville (Fork), Md.	Irwin, Pa. (1963); Edgewood Arsenal (1964); Chestertown (1968)
51st Arty/4th Bto{{HQ		1955	1960	--	--	Fort Monroe, Va.	
(56th Btn)	A	1955	1960	--	--	Fort Hill, Va.	
	B	1955	1960	--	--	Spegalville, Va.	
	C	1955	1960	--	--	Camp Patrick, Va.	
	D	1955	1960	--	--	Carrollton, Va.	

Unit	Battery	Ajax		Hercules		Location	Remarks
71st Arty/1st Btn (71st Btn)	HQ	1956	1958	1959	1965	Fort Belvoir, Va.	Rockville, Md. (1964)
	A	1956	1958	1959	1965	Rockville, Md.	Pomonkey (1959); Rockville (1960)
	B	1956	1958	1959	1965	Dranesville, Va.	S. Plainfield (1960); Dranesville (1961); Waldorf (1962); Davidsonville Md. (1963)
	C	1956	1958	1959	1964	Lorton, Va.	
	D	1956	1958	1959	1964	Fairfax, Va.	Laytonville, Md. (1960)
562nd Arty/3rd Btn (75th Btn)	HQ	1955	1958	1958	1962	Andrews AFB, Md.	
	A	1955	1958	1958	1962	Washington, DC	Waldorf, Md. (1957); Mattawoman (1959); Pomankey (1960)
	B	1955	1958	1958	1962	Silver Springs, Md.	Marlboro (1957)
	C	1955	1958	1958	1962	Landover Hills, Md.	Waldorf (1957)
	D	1957	1958	1958	1962	LaPlata, Md.	Brandywine (1959)
5th Arty/4th Btn (602nd Btn)	HQ	1955	—	1959	1960	Army Chemical Center, Md.	
	A	1955	1959	--	--	Baltimore, Md.	
	B	1955	1959	--	--	Baltimore, Md.	
	C	1955	--	1959	1960	Baltimore, Md.	Gaithersburg (1956)
	D	1955	—	1959	1960	Baltimore, Md.	Naylor (1956); Rockville (1959)
70th Arty/2nd Btn (Md. ARNG)		1960	1963	--	--	Washington/Baltimore	
170th Arty/2nd Btn (Va. ARNG)			1960	1962	--	--	Washington/Baltimore
70th Arty/1st Btn (Md. ARNG)		1962	1963	1963	1973	Washington/Baltimore	
280th Arty/1st Btn (Va. ARNG)		1962	1963	1963	1964	Washington/Baltimore	

Unit	Battery	Ajax		Hercules		Location	Remarks
111th Arty/4th Btn (Va. ARNG)		1960	1963	1964	1973	Hampton Roads, Va.	A battery relocated to Washington/ Baltimore in 1964
111th Arty/5th Btn		1960	1962	--	--		
43rd Arty/1st Btn (10th Btn)	HQ	1957	--	1959	1966	Fairchild AFB, Wash.	
	C	--	--	1962	1966	Fairchild AFB, Wash.	
	D	--	--	1962	1966	Fairchild AFB, Wash.	
43rd Arty/2nd Btn (28th Btn)	HQ	1957	1958	1959	1966	Redmond, Wash.	Turner AFB, Ga. (1960)
	A	1957	1958	1959	1966	Fort Lawton, Wash.	Turner AFB, Ga. (1960)
	B	1957	1958	1959	1966	Fort Lawton, Wash.	Turner AFB, Ga. (1960)
	C	1957	1958	1959	1962	Fort Lawton, Wash.	
	D	1957	1958	1959	1962	Fort Lawton, Wash.	
52nd Arty/1st Btn (83rd Btn)	HQ	1955	1958	1959	1961	Camp Hanford, Wash.	
60th Arty/4th Btn (433rd Btn)	HQ	1956	1960	1961	1962	Fort Lawton, Wash.	
	A	1956	1960	1961	1962	Vashon Isl., Wash.	Seattle (1960)
	B	1957	1960	1961	1962	Lake Youngs, Wash.	Vashon Isl. (1960)
	C	1957	1960	1961	1962	Seattle, Wash.	
	D	1956	1960	1961	1962	Paulsboro, Wash.	Seattle (1957); Fort Lawton (1960)
4th Arty/4th Btn (513th Btn)	HQ	1958	1958	1959	1972	Paulsboro, Wash.	Fort Lawton (1964)
	A	1958	1958	1959	1965	Seattle, Wash.	Kent (1962); Redmond (1963)
	B	1958	1958	1959	1972	Seattle, Wash.	Vashon Isl. (1960); Kingston (1969)
	C	1958	1958	1959	1972	Seattle, Wash.	Kingston (1963)
	D	1958	1958	1959	1962	Fort Lawton, Wash.	
205th Arty/2nd Btn (Wash. ARNG)		1960	1964	1964	1973AC	Seattle, Wash.	
205th Arty/3rd Btn (Wash. ARNG)		1960	1964	--	--	Seattle, Wash.	

Unit	Battery	Ajax		Hercules		Location	Remarks
57th Arty/3rd Btn (554th Btn)	HQ	1956	1958	1959	1964	Fort MacArthur, Calif.	
	B	1956	1958	1959	1964	Long Beach, Calif.	Fort MacArthur (1963)
	C	--	--	1962	1964	Fort MacArthur, Calif.	
	D	--	--	1962	1964	Fort MacArthur, Calif.	
56th Arty/1st Btn (933rd Btn)	HQ	1956	1959	1960	1969	Fort MacArthur, Calif.	Lang (1966)
	A	1956	1959	1960	1969	El Monte, Calif.	Puente Hills (1957); Pasadena (1963); Van Nuys (1964); Newhall (1968)
	B	1956	1959	1960	1964	Santa Ana AFB, Calif.	Mt. Disappointment (1957); Pasadena (1958); Fort MacArthur (1962)
	C	1956	1959	1960	1964	Santa Ana AFB, Calif.	Mt. Gleason (1957); Van Nuys (1958); Pasadena (1963)
	D	1956	1959	1960	1969	Santa Ana AFB, Calif.	Van Nuys (1957, 1960); Pasadena (1958, 1961); Palmdale (1968)
251st Arty/4th Btn (Calif. ARNG)		1960	1963	1963	1973AC	Los Angeles, Calif.	
3rd Arty/4th Btn (18th Btn)	HQ	1957	1958	1959	1961	Detroit, Mich.	
	A	1957	1958	1959	1961	Detroit, Mich.	
	C	1957	1958	1959	1961	Commerce, Mich.	Milford (1959)
	D	1957	1958	1959	1961	Algonac, Mich.	Auburn Hts. (1958)
55th Arty/3rd Btn (85th Btn)	HQ	1955	1957	1958	1961	Fort Wayne, Ind.	
	A	1955	1957	1958	1961	Detroit, Mich.	
	B	1956	1957	1958	1961	Detroit, Mich.	
	C	1955	1957	1958	1961	Detroit, Mich.	Riverview (1958); Wyando Hts. (1959)
	D	1955	1958	--	--	Detroit, Mich.	
517th Arty/2nd Btn (504th Btn)	HQ	1955	1959	1960	1963	Detroit, Mich.	
	A	1955	1959	1960	1963	Detroit, Mich.	
	B	1955	1959	1960	1963	Riverview, Mich.	Newport (1957, 1961)
	C	1955	1959	1960	1963	Newport, Mich.	Detroit (1956); Dearborn (1957); Romulus (1959)
	D	1955	1959	1960	1963	Newport, Mich.	Commerce (1956); Carleton (1960); Detroit (1961)

ORIGINAL Page

Unit	Battery	Ajax		Hercules		Location	Remarks
517th Arty/3rd Btn (516th Btn)	HQ	1955	1958	1959	1972	Selfridge AFB, Mich.	
	A	--	--	1962	1972	Selfridge AFB, Mich.	Union Lake (1971)
	B	1955	1958	1959	1969	Unica, Mich.	Detroit (1963)
	C	--	--	1962	1970	Milford, Mich.	Union Lake (1963); Selfridge AFB (1969)
	D	1955	1958	1959	1964	Auburn Hts., Mich.	Algonac (1958); Milford (1961)
177th Arty/1st Btn (Mich. ARNG)		1960	1962	1963	1973AC	Detroit, Mich.	
177th Arty/2nd Btn (Mich. ARNG)		1960	1962	--	--	Detroit, Mich.	
55th Arty/2nd Btn (11th Btn)	HQ	1956	1958	1959	1966	Manchester, Conn.	New Britain (1964)
	A	1956	1958	1959	1966	Windsor, Conn.	
	B	1956	1958	1959	1964	Portland, Conn.	Ansonia (1961)
	C	1956	1958	1959	1964	Manchester, Conn.	
	D	--	--	1961	1964	Cromwell, Conn.	
51st Arty/1st Btn (34th Btn)	HQ	1956	1961	--	--	Plaineville, Conn.	
	A	1956	1961	--	--	Simsbury, Conn.	
	C	1956	1961	--	--	Cromwell, Conn.	
44th Arty/3rd Btn (741st Btn)	HQ	1957	1961	--	--	Fairfield, Conn.	
	A	1957	1961	--	--	Shelton, Conn.	
	C	1957	1961	--	--	Westport, Conn.	
	D	1957	1961	--	--	Plainville, Conn.	
56th Arty/3rd Btn (967th Btn)	HQ	1956	1958	1959	1961	West Haven, Conn.	
	A	1956	1958	1959	1961	Milford, Conn.	
	B	1956	1958	1959	1961	Fairfield, Conn.	Ansonia (1958)
	C	1956	1958	1959	1961	Westport, Conn.	Shelton (1958)
59th Arty/4th Btn (38th Btn)	HQ	1955	1958	1959	1971	Norfolk, Va.	Fort Story
	A	1955	1958	1959	1964	Norfolk, Va.	Carrollton (1960)
	B	1955	1958	1959	1965	Norfolk, Va.	Deep Fork (1963)
	C	1955	1958	1959	1965	Norfolk, Va.	Camp Patrick (1960)
	D	1955	1958	1959	1971	Norfolk, Va.	Fort Story (1970)

Unit	Battery	Ajax		Hercules		Location	Remarks
4th Arty/1st Btn (44th Btn)	HQ	1955	1958	1959	1970	Fort Niagara, N.Y.	Lockport AFB (1964); Sanborn (1967)
	A	1955	1958	1959	1964	Model City, N.Y.	Lancaster (1962)
	B	1955	1958	1959	1969	Cambria, N.Y.	
	C	1955	1958	1959	1964	Grand Island, N.Y.	
	D	1955	1958	1959	1964	Grand Island, N.Y.	
44th Arty/4th Btn (168th Btn)	HQ	1958	AC	--	--	Fort Bliss, Tex.	
68th Arty/1st Btn (351st Btn)	HQ	1956	1958	1959	1961	Warren, Ohio	
	A	1956	1958	1959	1961	Cleveland, Ohio	
	B	1956	1959	--	--	Cleveland, Ohio	
	C	--	--	1959	1961	Cleveland, Ohio	Warren (1960)
	D	--	--	1959	1961	Cleveland, Ohio	Warren (1960)
67th Arty/3rd Btn (401st Btn)	HQ	1956	1958	1959	1961	Paynesville, Wis.	
	A	1956	1958	1959	1961	River Hills, Wis.	Prospect (1958); Muskeegon (1960)
	B	1956	1958	1959	1961	Milwaukee, Wis.	
	D	1956	1958	1959	1961	Milwaukee, Wis.	Waukesha (1958)
62nd Arty/2nd Btn (465th Btn)	HQ	1956	1958	1959	1962	Fort Niagara, N.Y.	
	A	1956	1958	1959	1962	Millersport, N.Y.	
	C	1956	1958	1959	1962	Orchard Park, N.Y.	
	D	1956	1958	1959	1962	Hamburg, N.Y.	
52nd Arty/2nd Btn (495th Btn)	HQ	1955	1958	1959	AC	Fort Bliss, Tex.	Homestead AFB, Fla. (1972)
	A	--	--	1964	1972	Homestead AFB, Fla.	
	B	--	--	1962	1972	Homestead AFB, Fla.	
	C	--	--	1964	1972	Homestead AFB, Fla.	
	D	--	--	1964	1969	Homestead AFB, Fla.	
65th Arty/3rd Btn (508th Btn)	HQ	1957	1959	1960	1971	Cleveland, Ohio	
	A	1958	1959	1960	1971	Cleveland, Ohio	Painesville (1959)
	C	1957	1959	1960	1964	Cleveland, Ohio	Warren (1961)
	D	1957	1959	1960	1971	Cleveland, Ohio	Lordstown (1957)

Unit	Battery	Ajax		Hercules		Location	Remarks
67th Arty/2nd Btn (531st Btn)	HQ	1957	1958	1959	1961	Ellsworth AFB, Calif.	
61st Arty/3rd Btn (548th Btn)	HQ	1957	1958	1959	1966	Loring AFB, Maine	
	A	1957	1958	1959	1966	Coswell, Maine	
	B	1957	1958	1959	1965	Limestone, Maine	
	C	1957	1958	1959	1966	Caribou, Maine	
	D	1957	1958	1959	1964	Connor, Maine	
61st Arty/1st Btn (436th Btn)	HQ	1958	--	1959	AC	Travis AFB, Calif.	Presidio (1971)
	A	--	--	1963	AC	Travis AFB, Calif.	
	B	--	--	1963	AC	Travis AFB, Calif.	Fort Barry (1971, 1973)
	C	--	--	1971	1971	Travis AFB, Calif.	
7th Arty/4th Btn	HQ	--	--	1960	--	Bergstrom AFB, Tex.	
	A	--	--	1962	--	Bergstrom AFB, Tex.	Elroy (1963)
	B	--	--	1962	--	Bergstrom AFB, Tex.	Austin (1963)
43rd Arty/4th Btn	HQ	--	--	1959	1974	Fort Richardson, Alaska	
43rd Arty/6th Btn	HQ	--	--	1960	1966	Omaha AFB, Nebr.	
	A	--	--	1962	1966	Omaha AFB, Nebr.	Treynor (1963)
	B	--	--	1962	1966	Omaha AFB, Nebr.	Louisville (1963)
	C	--	--	1962	1966	Omaha AFB, Nebr.	Crete (1963)
	D	--	--	1962	1966	Omaha AFB, Nebr.	Davey (1963)
51st Arty/6th Btn	HQ	--	--	1960	AC	Mt. Home AFB, Idaho	Fort Bliss, Tex. (1967)
55th Arty/4th Btn	HQ	--	--	1965	1967	Fort Totten, N.Y.	
55th Arty/5th Btn	HQ	--	--	1959	1969	Olathe NAS, Kans.	
	A	--	--	1962	1965	Olathe NAS, Kans.	Lawson, Mo. (1963)
	B	--	--	1962	1965	Olathe NAS, Kans.	Pleasent, Mo. (1963)
	C	--	--	1962	1969	Olathe NAS, Kans.	Gardner (1963)
	D	--	--	1962	1969	Olathe NAS, Kans.	Fort Leavenworth (1963)

Unit	Battery	Ajax		Hercules		Location	Remarks
56th Arty/5th Btn	HQ	--	--	1959	1970	Wilmington, Ohio	Cincinnati (1961); Wilmington (1963)
	A	--	--	1962	1969	Wilmington, Ohio	Cincinnati (1967)
	B	--	--	1962	1965	Wilmington, Ohio	Felicity (1963)
	C	--	--	1962	1970	Wilmington, Ohio	Dillsboro (1963, 1968); Cincinnati (1967)
	D	--	--	1962	1965	Wilmington, Ohio	Oxford (1963)
62nd Arty/1st Btn	HQ	--	--	1959	1969	Scott AFB, Ill.	
	A	--	--	1962	1969	Scott AFB, Ill.	Marine (1963)
	B	--	--	1962	1969	Scott AFB, Ill.	Hecker (1963)
	C	--	--	1962	1969	Scott AFB, Ill.	Pacific, Mo. (1963)
	D	--	--	1962	1969	Scott AFB, Ill.	Pere Marquette (1964); Grafton (1968)
62nd Arty/4th Btn	HQ	--	--	1959	AC	Fort Bliss, Tex.	
68th Arty/3rd Btn	HQ	--	--	1959	AC	Minneapolis, Minn.	Snelling AFB (1964); Homestead AFB, Fla (1972)
	A	--	--	1960	1971	Roberts, Wis.	
	B	--	--	1960	1971	Farmington, Minn.	
	C	--	--	1960	1971	St. Bonifacius, Minn.	
	D	--	--	1960	1971	Bethel, Minn.	
333rd Arty/1st Btn	HQ	--	--	1964	1970	Fort Bliss, Tex.	
517th Arty/5th Btn	HQ	--	--	1960	1966	Dyess AFB, Tex.	
	A	--	--	1962	1966	Dyess AFB, Tex.	Abilene (1963)
	B	--	--	1962	1966	Dyess AFB, Tex.	Abilene (1963)
562nd Arty/2nd Btn	HQ	--	--	1959	AC	Eielson AFB, Alaska	Fort Wainwright (1964)
	A	--	--	1961	AC	Fort Wainwright, Alaska	Eielson AFB (1964, 1972)
	B	--	--	1961	AC	Fort Wainwright, Alaska	Eielson AFB (1964, 1972)
	C	--	--	1961	1970	Fort Wainwright, Alaska	Eielson AFB (1964)
	D	--	--	1961	1970	Fort Wainwright, Alaska	Eielson AFB (1964)

ORIGINAL (Red)

Unit	Battery	Ajax		Hercules		Location	Remarks
562nd Arty/4th Btn	HQ	--	--	1959	1969	Duncanville AFB, Tex.	
	A	--	--	1962	1965	Duncanville AFB, Tex.	Denton (1963)
	B	--	--	1962	1965	Duncanville AFB, Tex.	Terrell (1963)
	C	--	--	1962	1969	Duncanville AFB, Tex.	Alvarado (1963, 1968); Dallas (1967)
	D	--	--	1962	1969	Duncanville AFB, Tex.	Fort Wolters (1963, 1968); Dallas (1967)
562nd Arty/5th Btn	HQ	--	--	1960	1966	Louisiana Ord. Plant (Shreveport), La.	
	A	--	--	1962	1966	Louisiana Ord. Plant (Shreveport), La.	Bellevue (1963)
	B	--	--	1962	1966	Louisiana Ord. Plant (Shreveport), La.	Stonewall (1963)

ORIGINAL (Red)

ORIGINAL (Red)

APPENDIX B-3

METROPOLITAN DEFENSE AREA MAPS

"NOTICE"

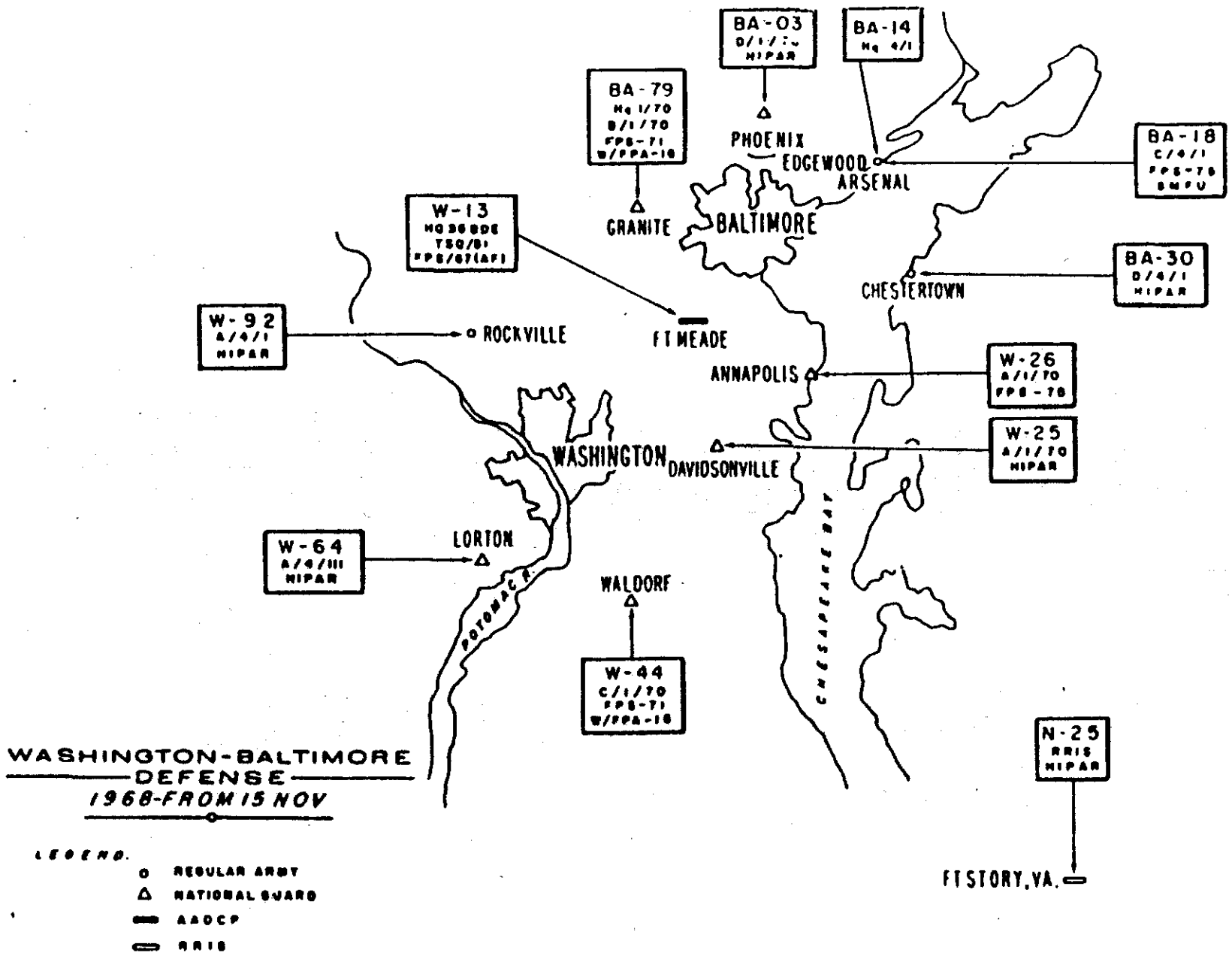
The documents contained in this Appendix have been reproduced from the best copies available. Although certain portions are illegible, this material is being released in the interest of making available as much information as possible.

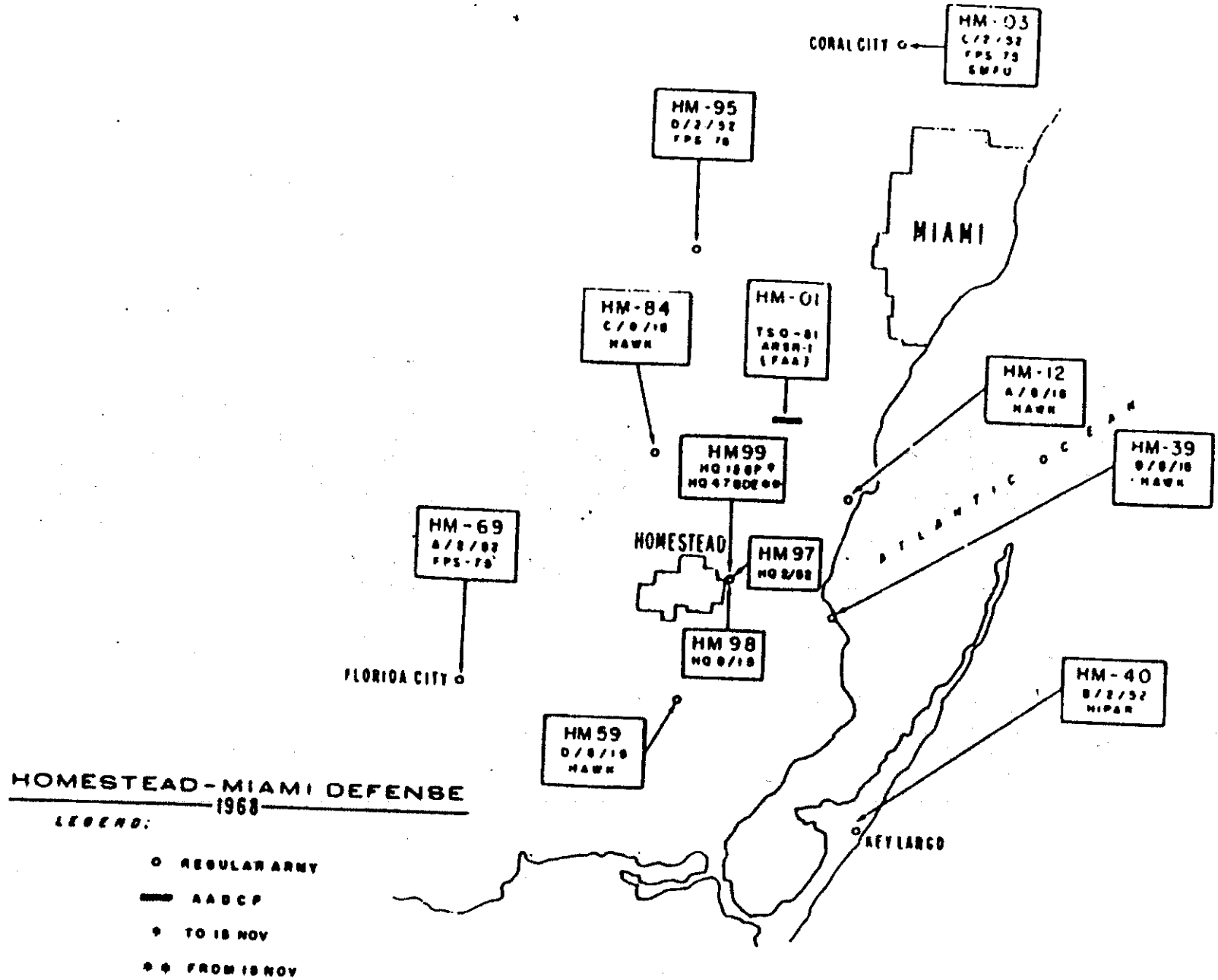
APPENDIX B-3

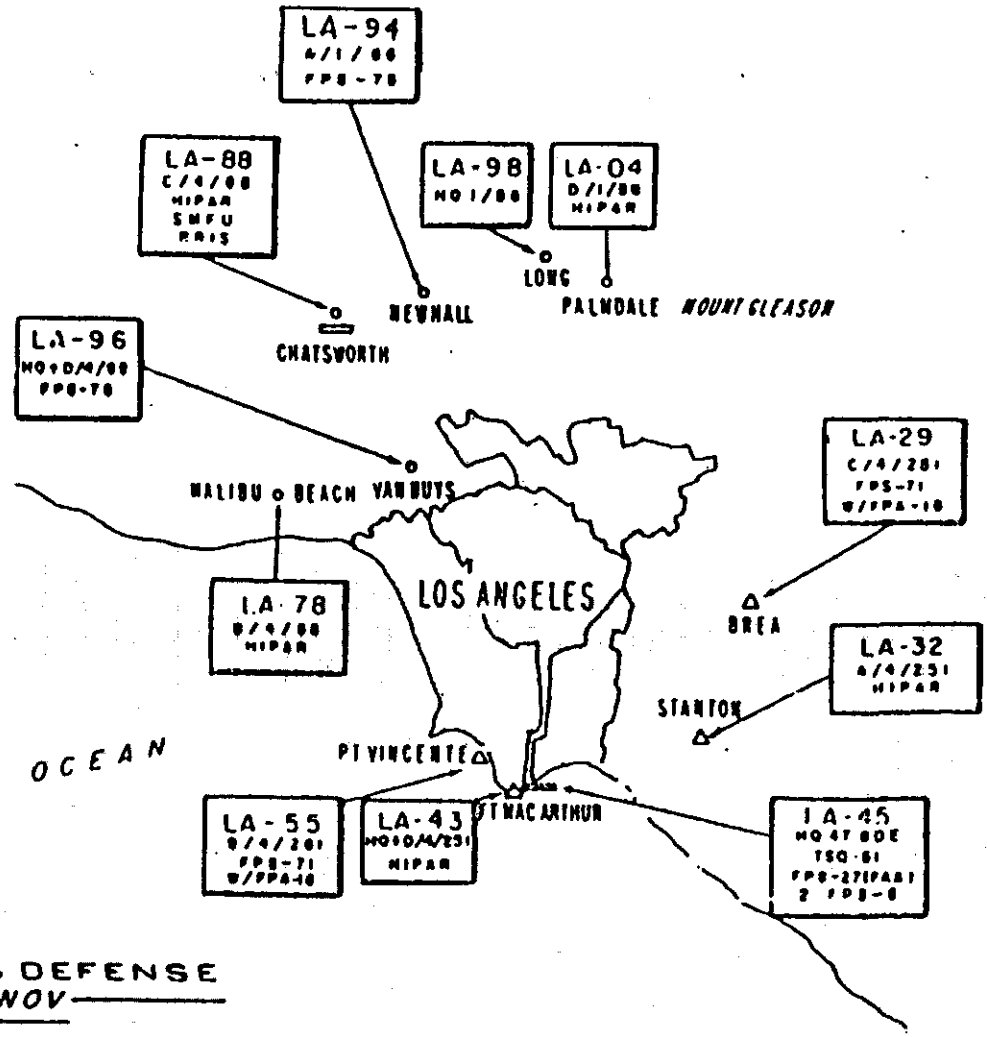
METROPOLITAN DEFENSE AREA MAPS

The maps presented in this section show the location of ARADCOM sites in CONUS as of 1968 and give certain information about the unit and equipment at each site. The top line in each box gives the COE designation for the property, such as LA-04. The second line is a military unit designation (for example, A/4/65 to indicate A battery, 4th Battalion, 65th Artillery). Other items in the boxes describe certain equipment at the site, such as HIPAR for high-power acquisition radar, and HAWK for a Hawk missile battery. The other codes have not been identified.

Personnel at the NORAD History Office in Colorado Springs, Colo., provided the maps presented, which were included in an annual historical summary report produced in 1968. Similar maps could not be located for other years.


BA-03
D/1/70
HIPAR
BA-14
Hq 4/1
BA-79
Hq 1/70
B/1/70
FPS-71
W/FPA-18
BA-18
C/4/1
FPS-78
SMFU
PHOENIX
EDGEWOOD
ARSENAL
GRANITE
BALTIMORE
W-13
HQ 36 BDE
TSQ/81
FPS/67(AF)
BA-30
D/4/1
HIPAR
CHESTERTOWN
W-92
A/4/1
HIPAR
ROCKVILLE
FT MEADE
ANNAPOLIS
W-26
A/1/70
FPS-78
W-25
A/1/70
HIPAR
WASHINGTON
DAVIDSONVILLE
W-64
A/4/III
HIPAR
LORTON
POTOMAC R.
WALDORF
W-44
C/1/70
FPS-71
W/FPA-18
CHESAPEAKE BAY
N-25
RRIS
HIPAR
FT STORY, VA.
WASHINGTON-BALTIMORE
DEFENSE
1968-FROM 15 NOV
LEGEND.
REGULAR ARMY
NATIONAL GUARD
AADCP
RRIS

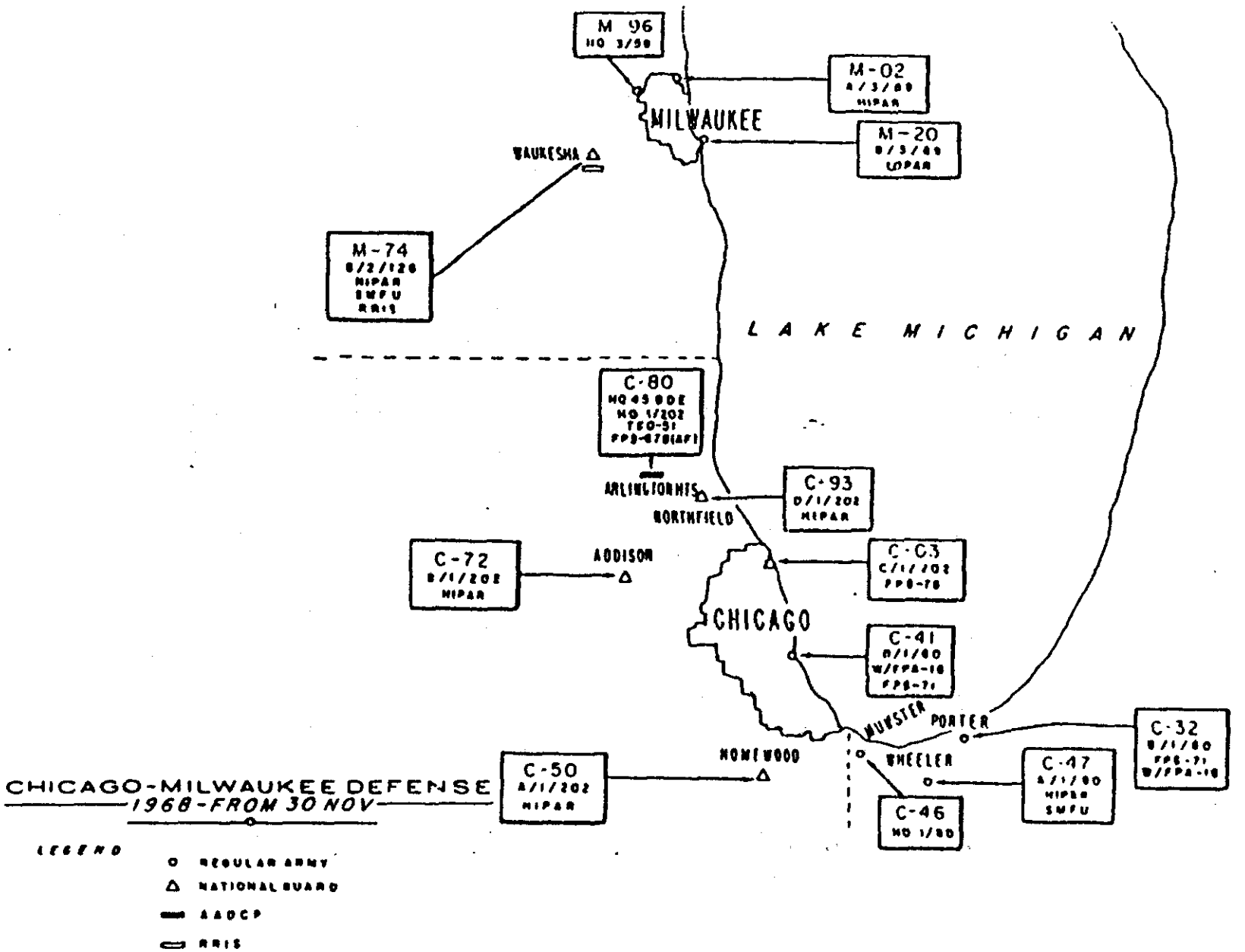

HOMESTEAD-MIAMI DEFENSE
1968
LEGEND:
REGULAR ARMY
AADCP
TO 18 NOV
FROM 18 NOV
CORAL CITY
HM-03
HM-95
MIAMI
HM-84
HM-01
HM-12
HM-39
HM99
HOMESTEAD
HM-69
HM 97
HM 98
FLORIDA CITY
HM-40
HM 59
KEY LARGO
ATLANTIC OCEAN



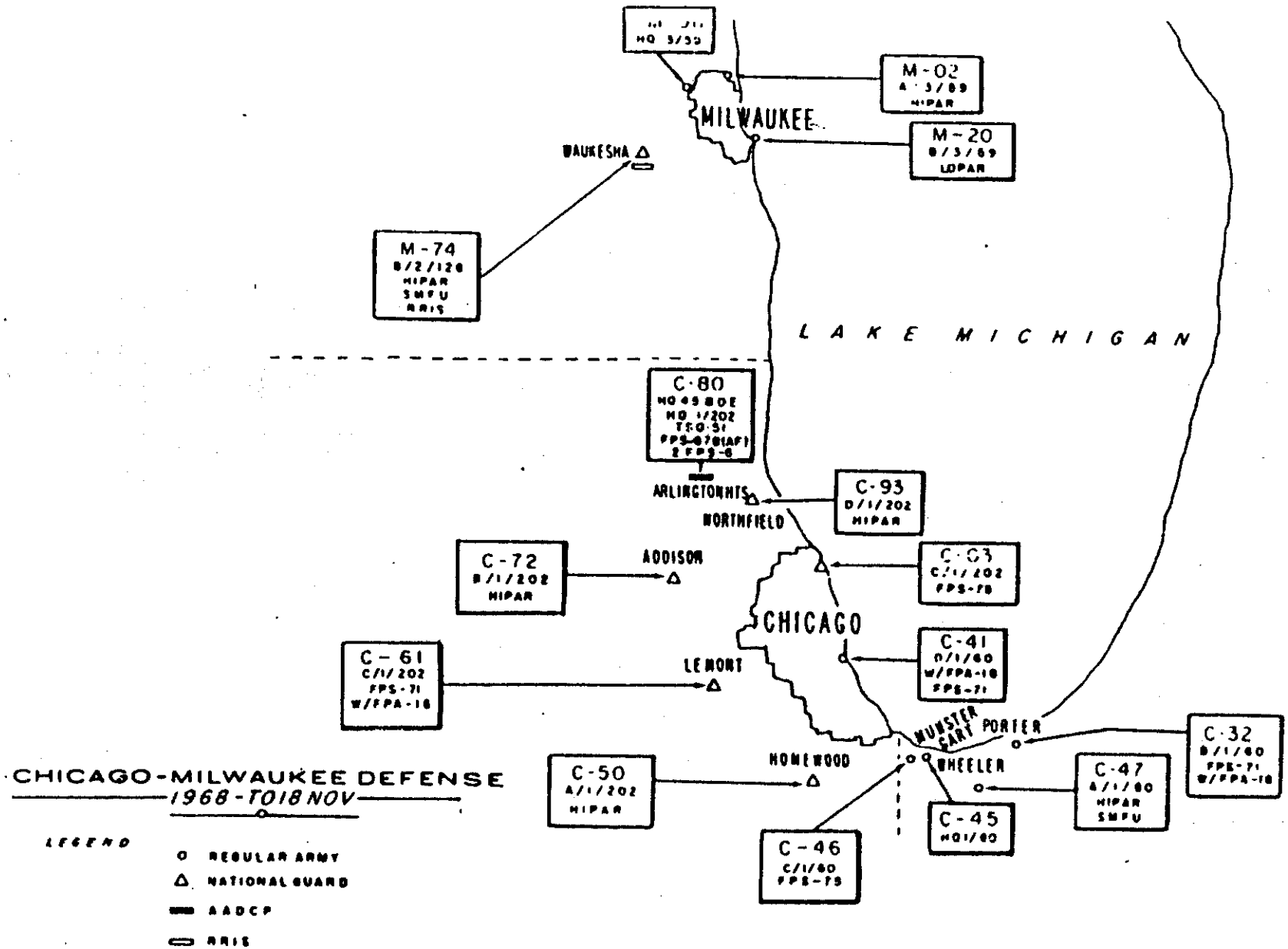
LOS ANGELES DEFENSE
1968-TO NOV

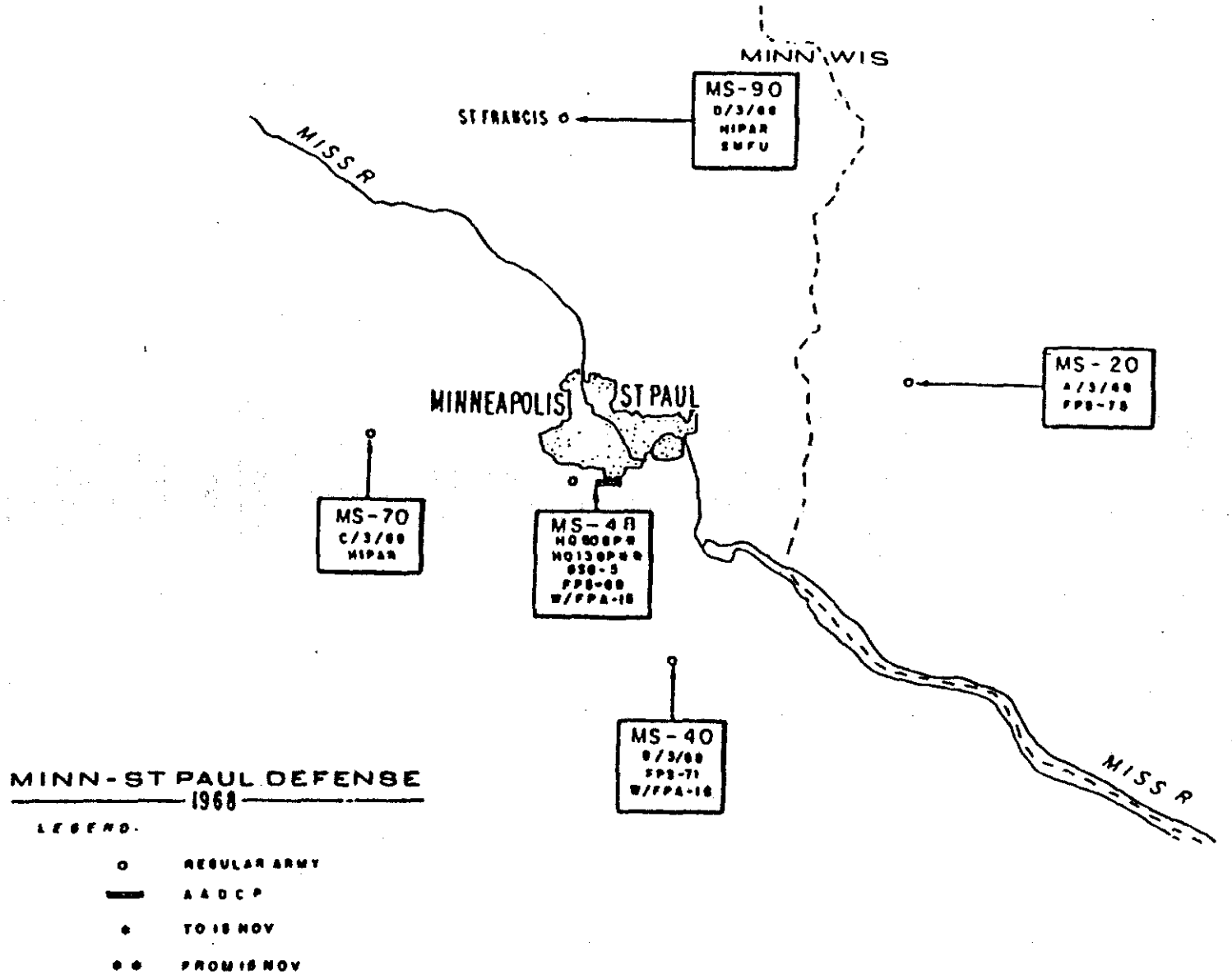
LEGEND:

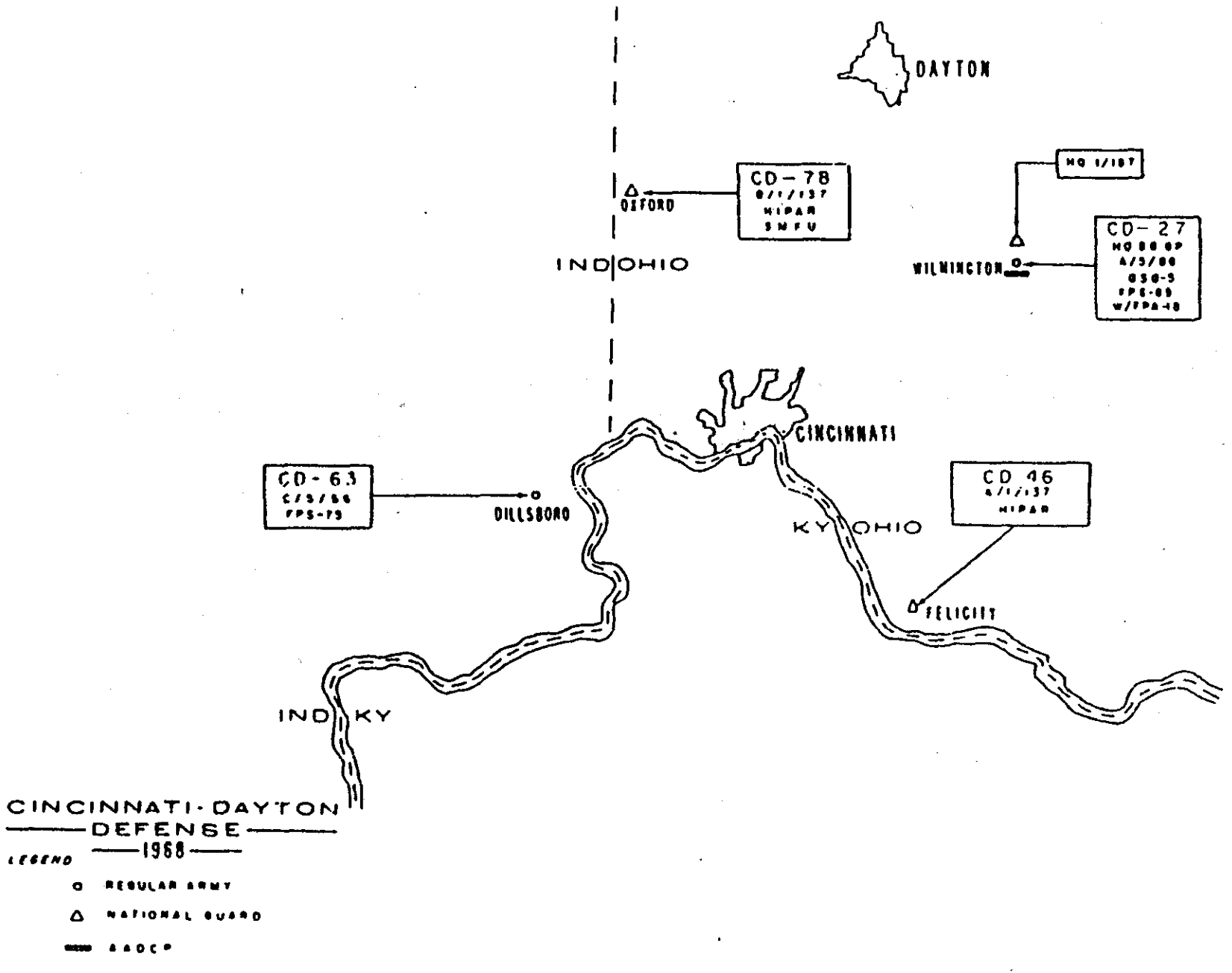
- ○ REGULAR ARMY
- △ NATIONAL GUARD
- ▬ RADCP
- ▭ RRIS

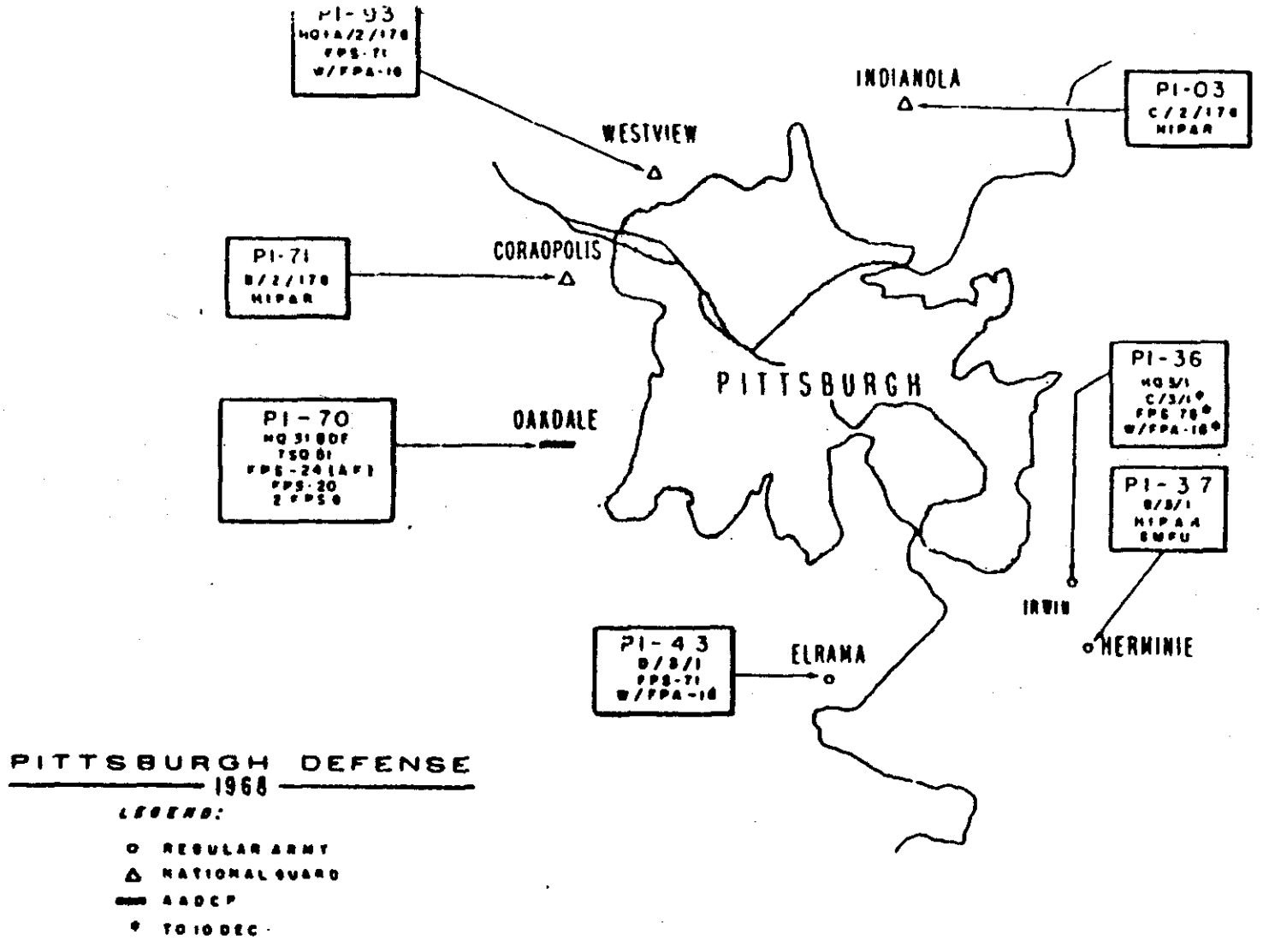


CHICAGO-MILWAUKEE DEFENSE
1968-FROM 30 NOV


MILWAUKEE
M-02
A-3/69
HIPAR
M-20
B/3/69
LOPAR
WAUKESHA
M-74
B/2/128
HIPAR
SMFU
RRIS
LAKE MICHIGAN
C-80
HQ 45 BDE
HQ 1/202
TSQ-51
FPS-67B(AF)
2 FPS-6
ARLINGTON HTS
NORTHFIELD
C-93
D/1/202
HIPAR
C-72
B/1/202
HIPAR
ADDISON
C-03
C/1/202
FPS-75
CHICAGO
C-41
D/1/60
W/FPA-18
FPS-71
C-61
C/1/202
FPS-71
W/FPA-18
LEMONT
MUNSTER
GARY
PORTER
C-32
B/1/60
FPS-71
W/FPA-18
C-50
A/1/202
HIPAR
HOMEWOOD
WHEELER
C-47
A/1/60
HIPAR
SMFU
C-45
HQ1/60
C-46
C/1/60
FPS-75
CHICAGO-MILWAUKEE DEFENSE
1968-TO18 NOV
LEGEND
REGULAR ARMY
NATIONAL GUARD
AADCP
RRIS


MINN WIS
MS-90
D/3/68
HIPAR
SMFU
ST FRANCIS
MISS R
MINNEAPOLIS
ST PAUL
MS-20
A/3/68
FPS-78
MS-70
C/3/68
HIPAR
MS-48
HQ 50 SPR
HQ 130 PRR
GSG-5
FPS-69
W/FPA-16
MS-40
B/3/68
FPS-71
W/FPA-16
MISS R
MINN-ST PAUL DEFENSE
1968
LEGEND.
REGULAR ARMY
A A D C P
TO 15 NOV
FROM 15 NOV

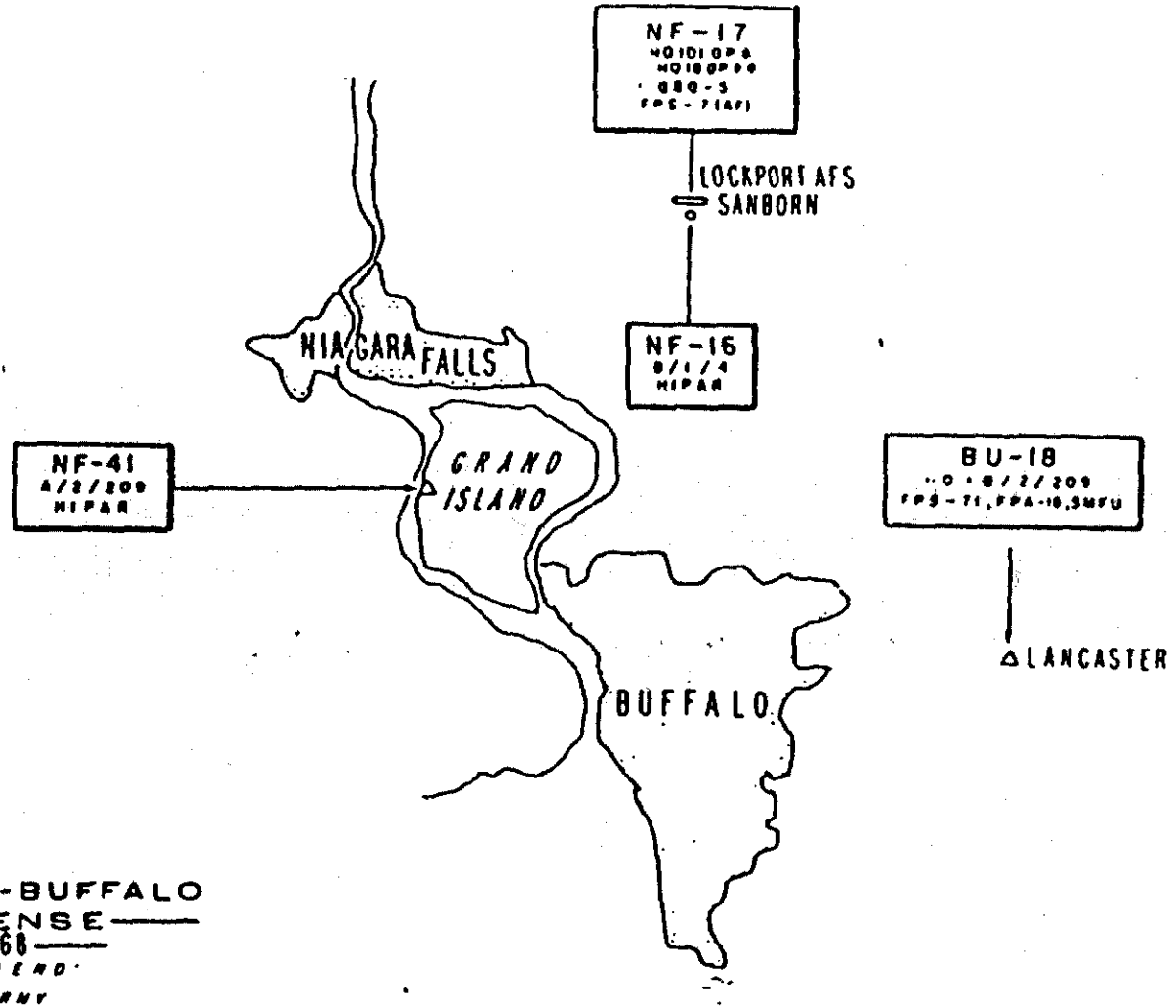

DAYTON
CD-78
OXFORD
IND OHIO
WILMINGTON
CD-27
CINCINNATI
CD-63
DILLSBORO
CD 46
KY OHIO
FELICITY
IND KY
CINCINNATI-DAYTON
DEFENSE
1968
LEGEND
REGULAR ARMY
NATIONAL GUARD
AADCP



PITTSBURGH DEFENSE
1968

LEGEND:

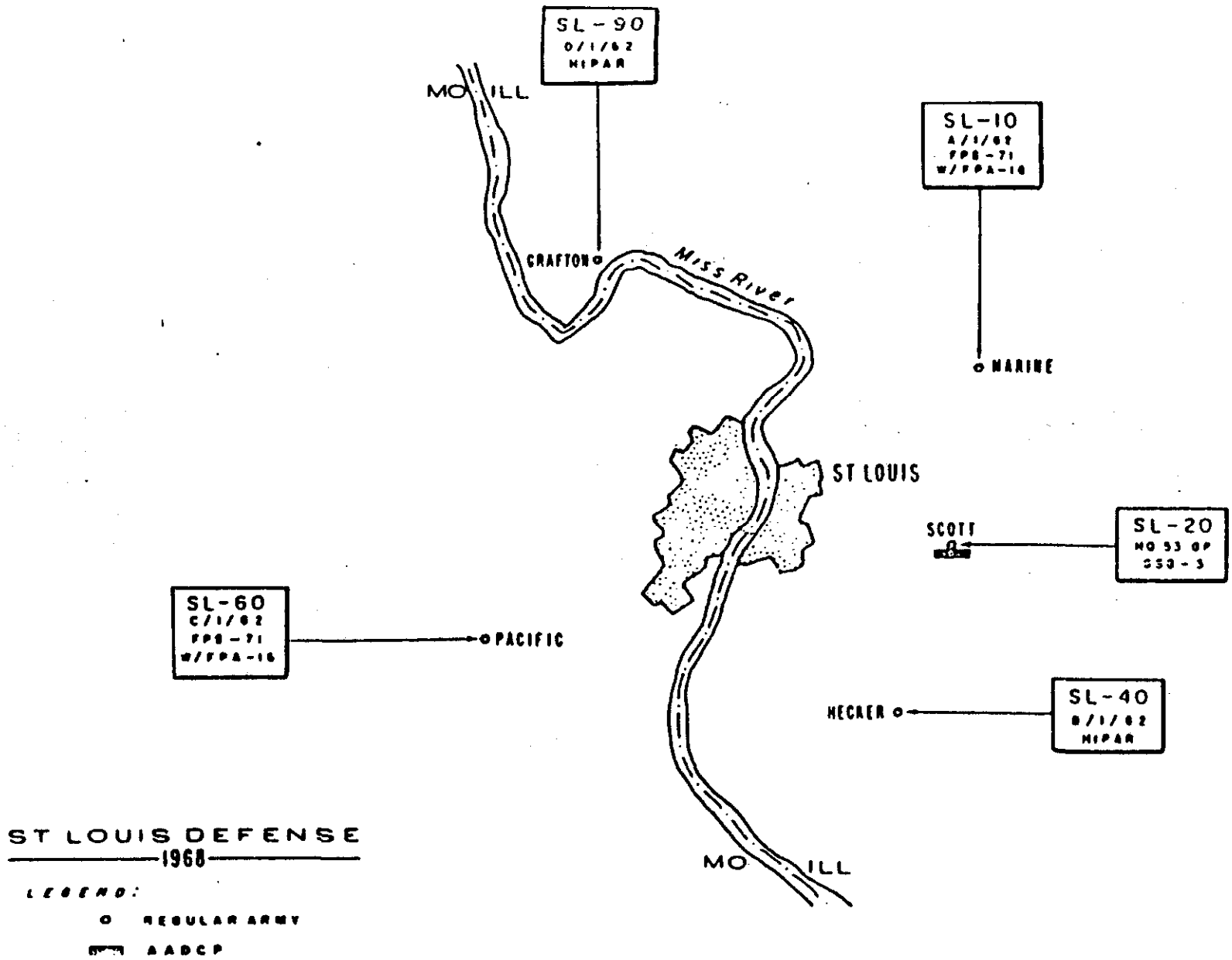
- ○ REGULAR ARMY
- △ NATIONAL GUARD
- ▬ AADCP
- * TO 10 DEC



NIAGARA-BUFFALO
DEFENSE
1968

LEGEND:

- REGULAR ARMY
- NATIONAL GUARD
- AADCP
- TO IS NOV
- FROM IS NOV

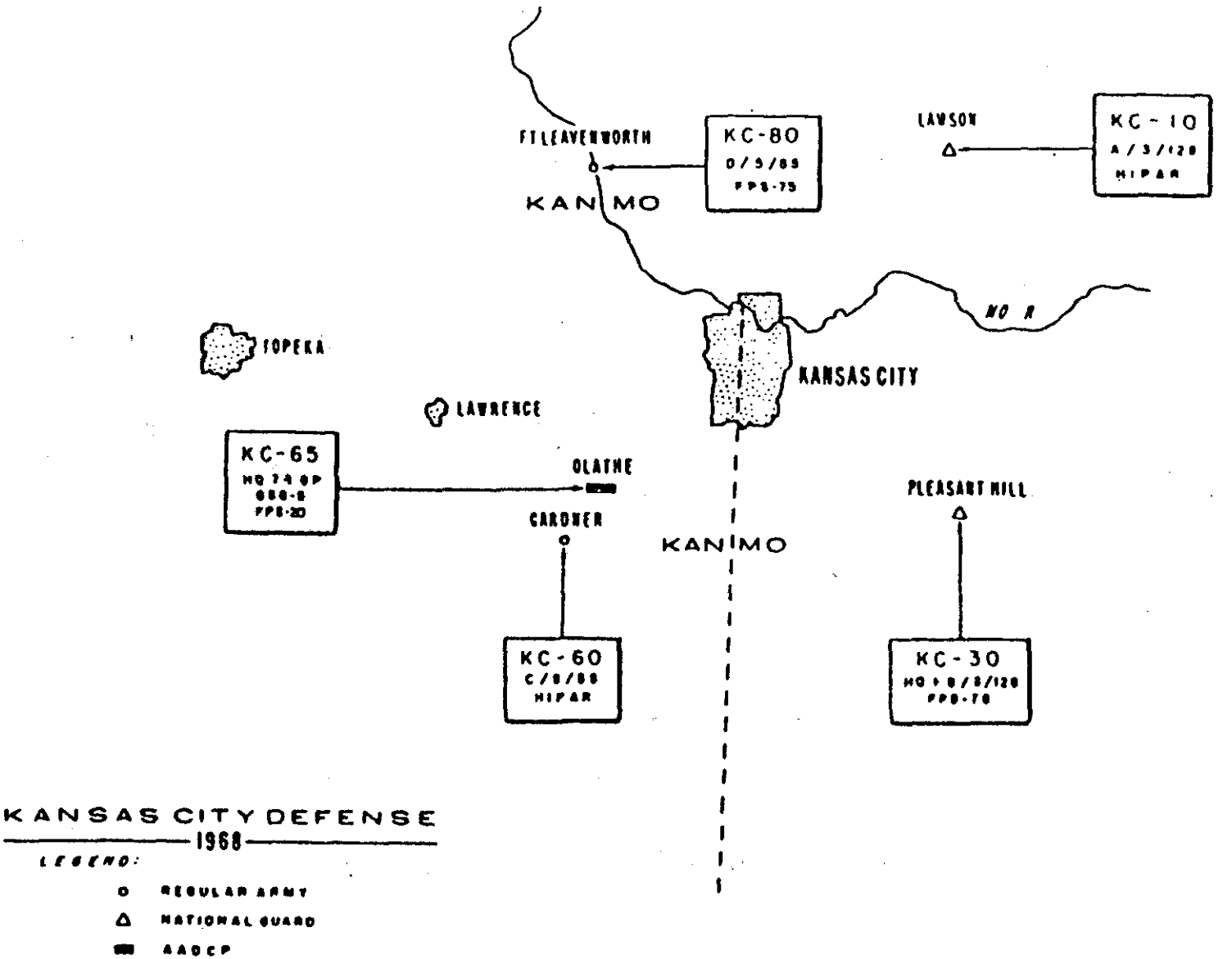


ST LOUIS DEFENSE
1968

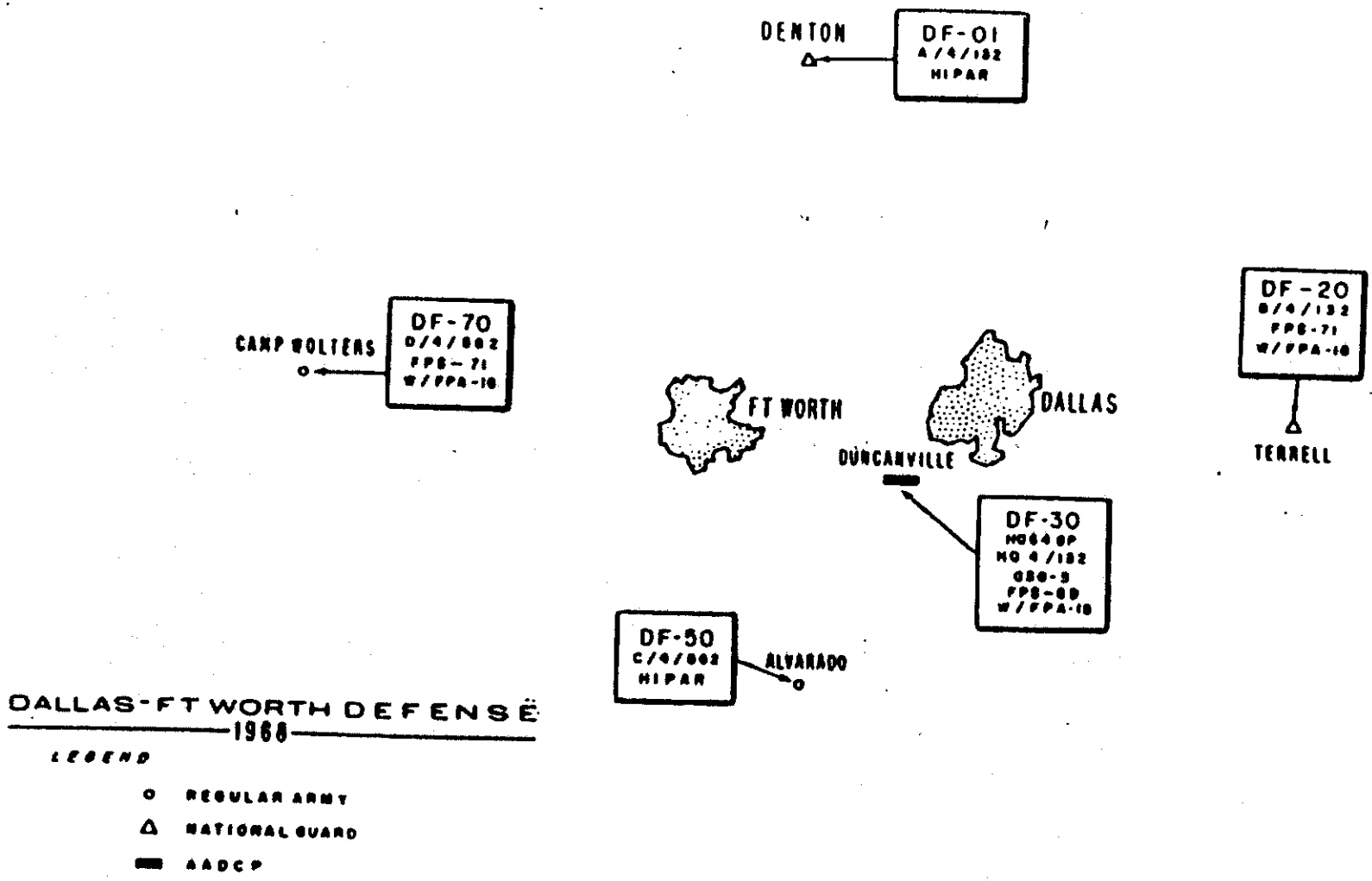
LEGEND:

o REGULAR ARMY

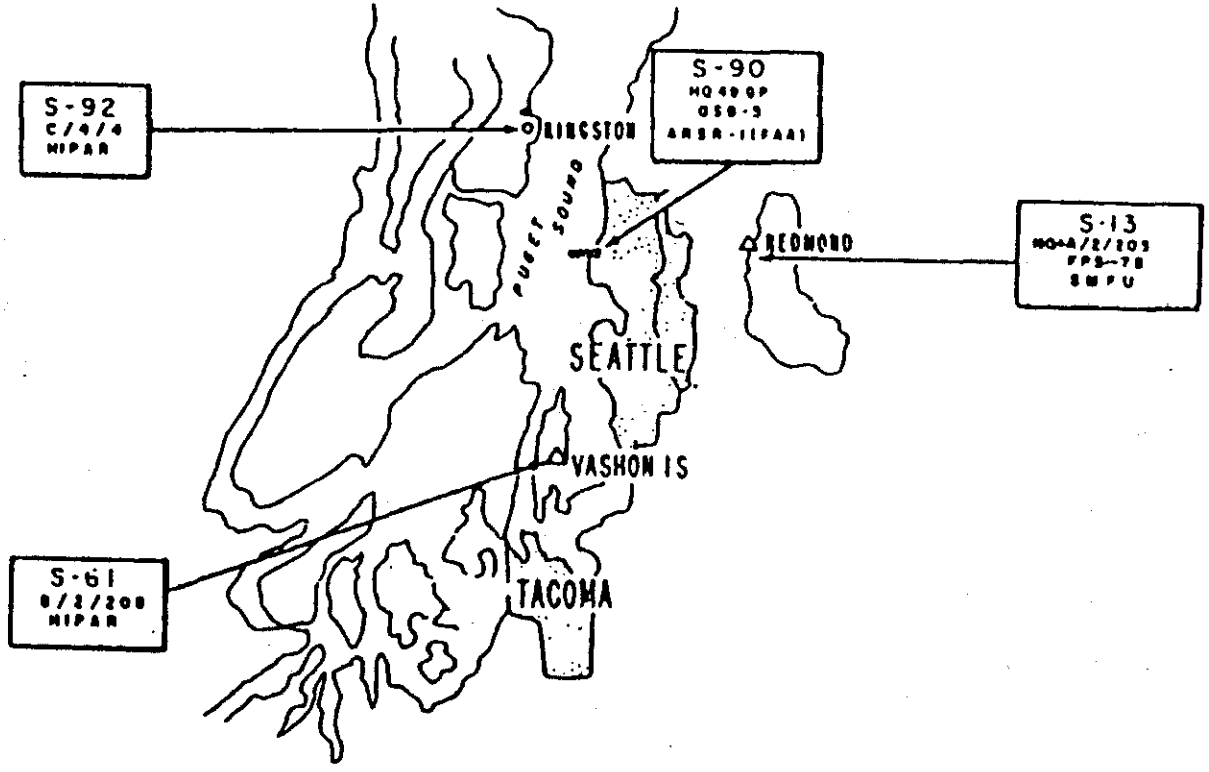
AADCP



KANSAS CITY DEFENSE
1968



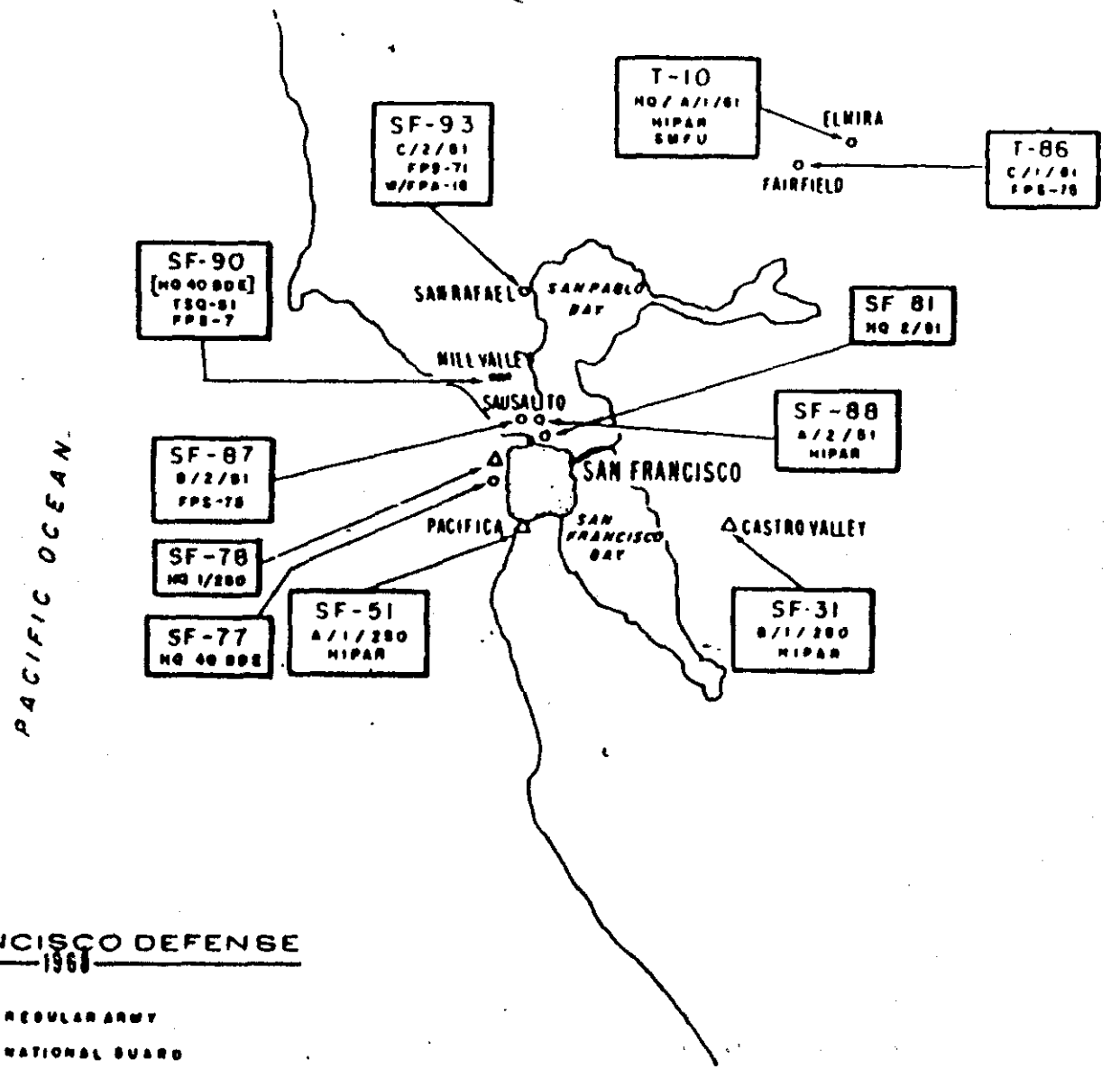
DALLAS-FT WORTH DEFENSE
1968



SEATTLE DEFENSE
1968

LEGEND:

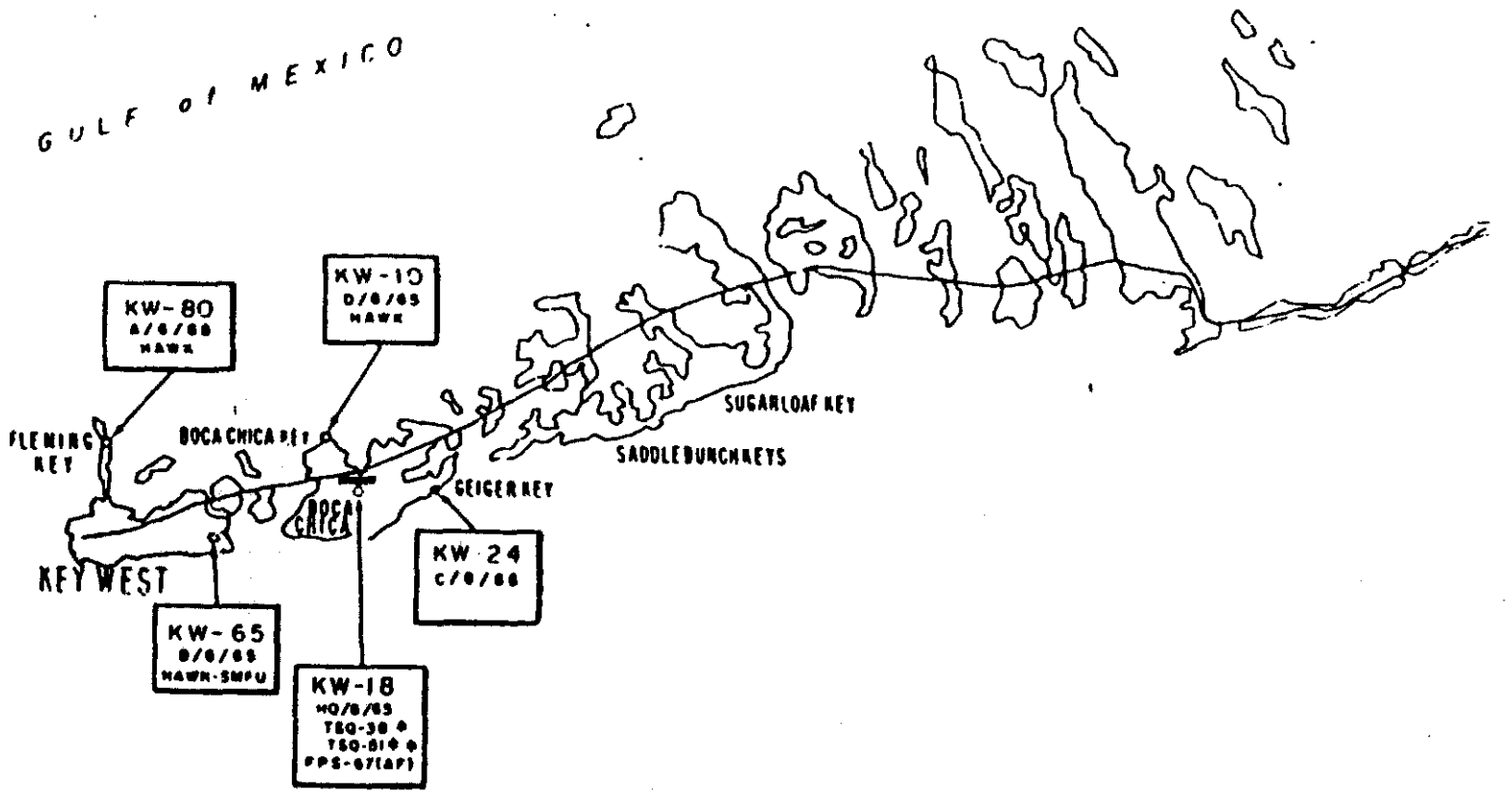
- ○ REGULAR ARMY
- △ NATIONAL GUARD
- ▬ AADCP



SAN FRANCISCO DEFENSE
1968

LEGEND:

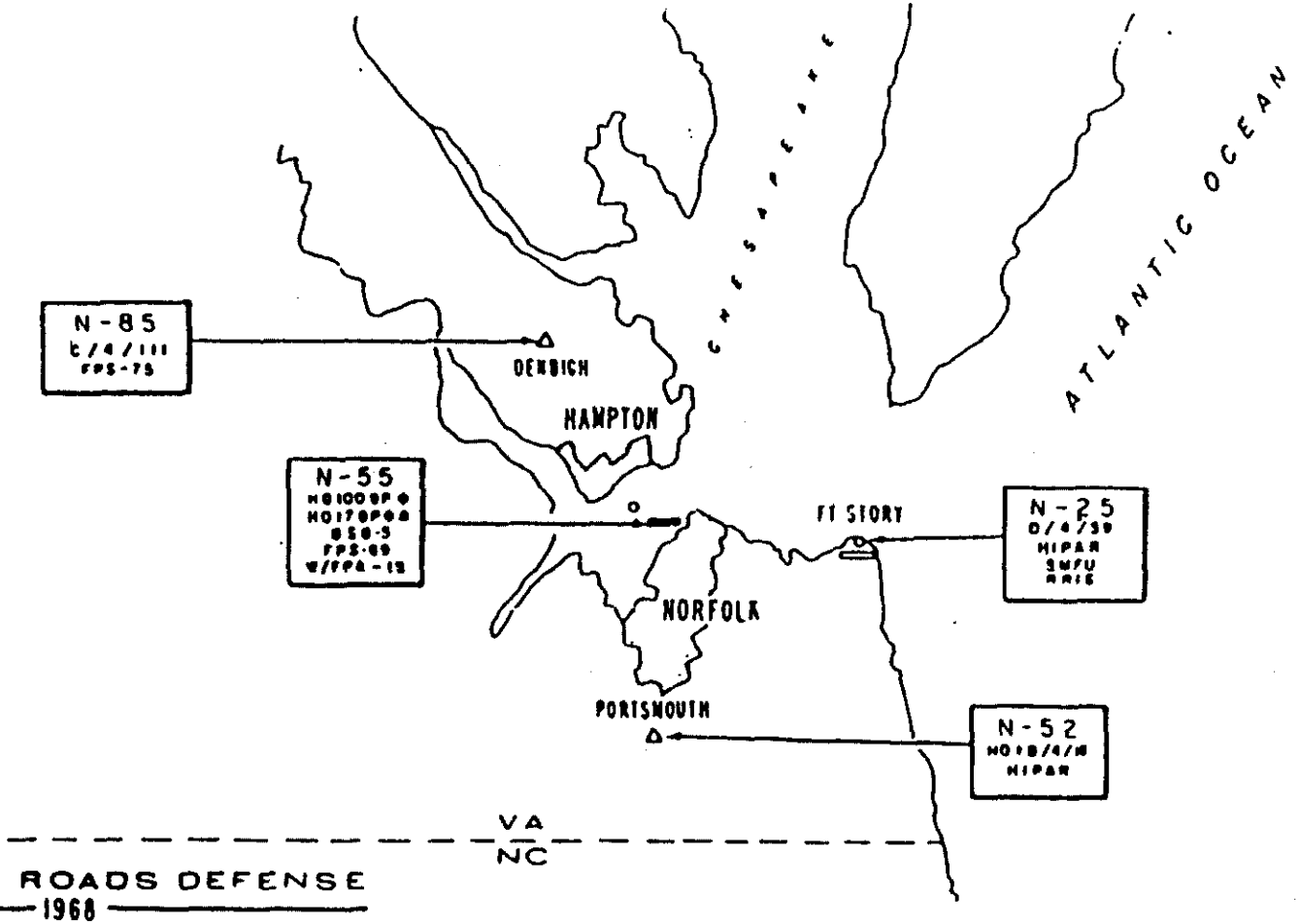
- ○ REGULAR ARMY
- △ NATIONAL GUARD
- ▬ AADCP



KEY WEST DEFENSE
1968

LEGEND:

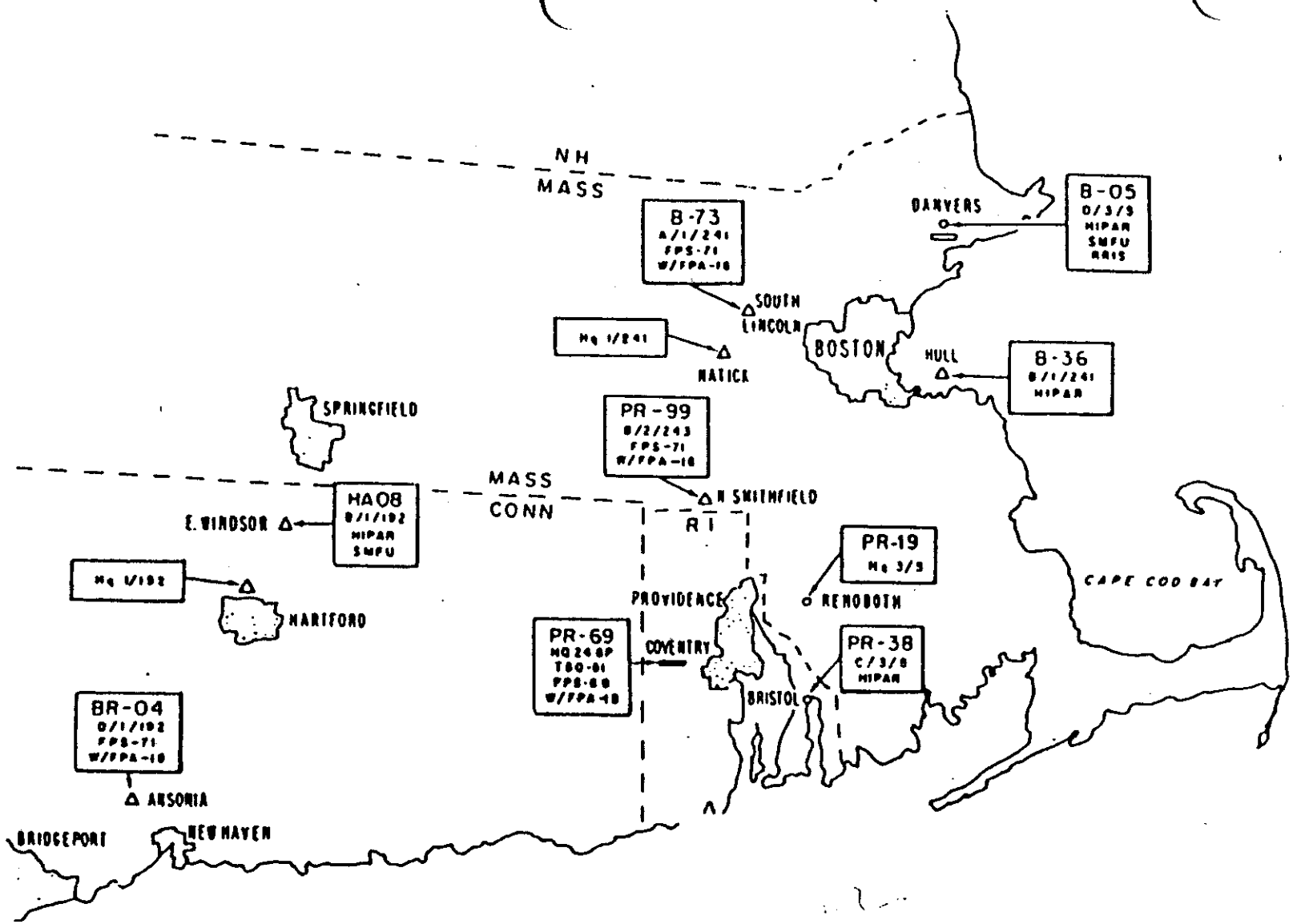
- ○ REGULAR ARMY
- ▬ AADCP
- ◆ TOI WAY (MANUAL OPNS TO 1 OCT)
- ● ◆ FROM 1 OCT



HAMPTON ROADS DEFENSE
1968

LEGEND:

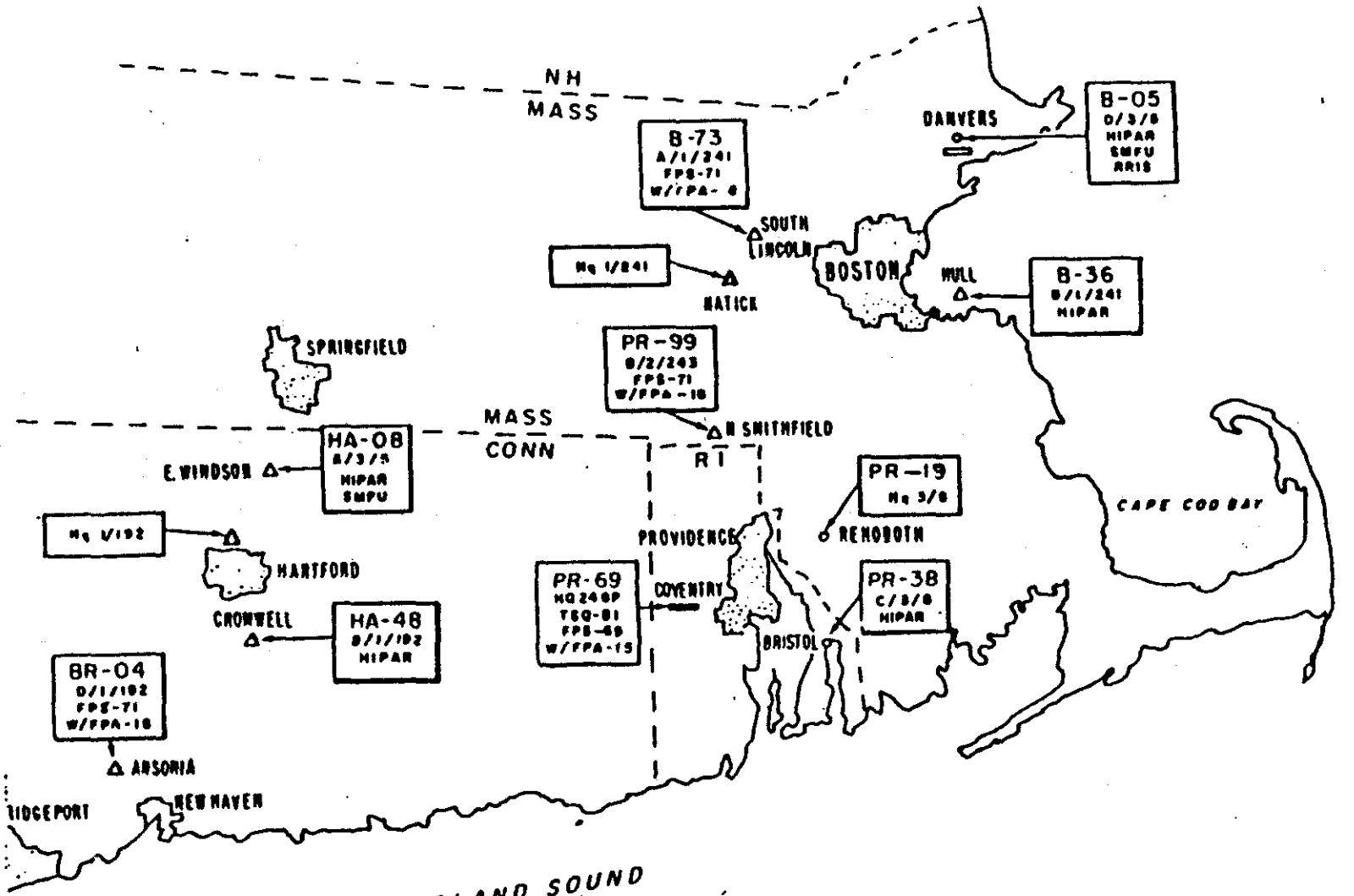
- ○ REGULAR ARMY
- △ NATIONAL GUARD
- ▬ AAOCP
- ▭ ARIS (PART of WASH/BALT DEF)
- ✦ TO 15 NOV
- ✦✦ FROM 15 NOV



NEW ENGLAND DEFENSE
—1968-FROM 15 NOV—

LEGEND:

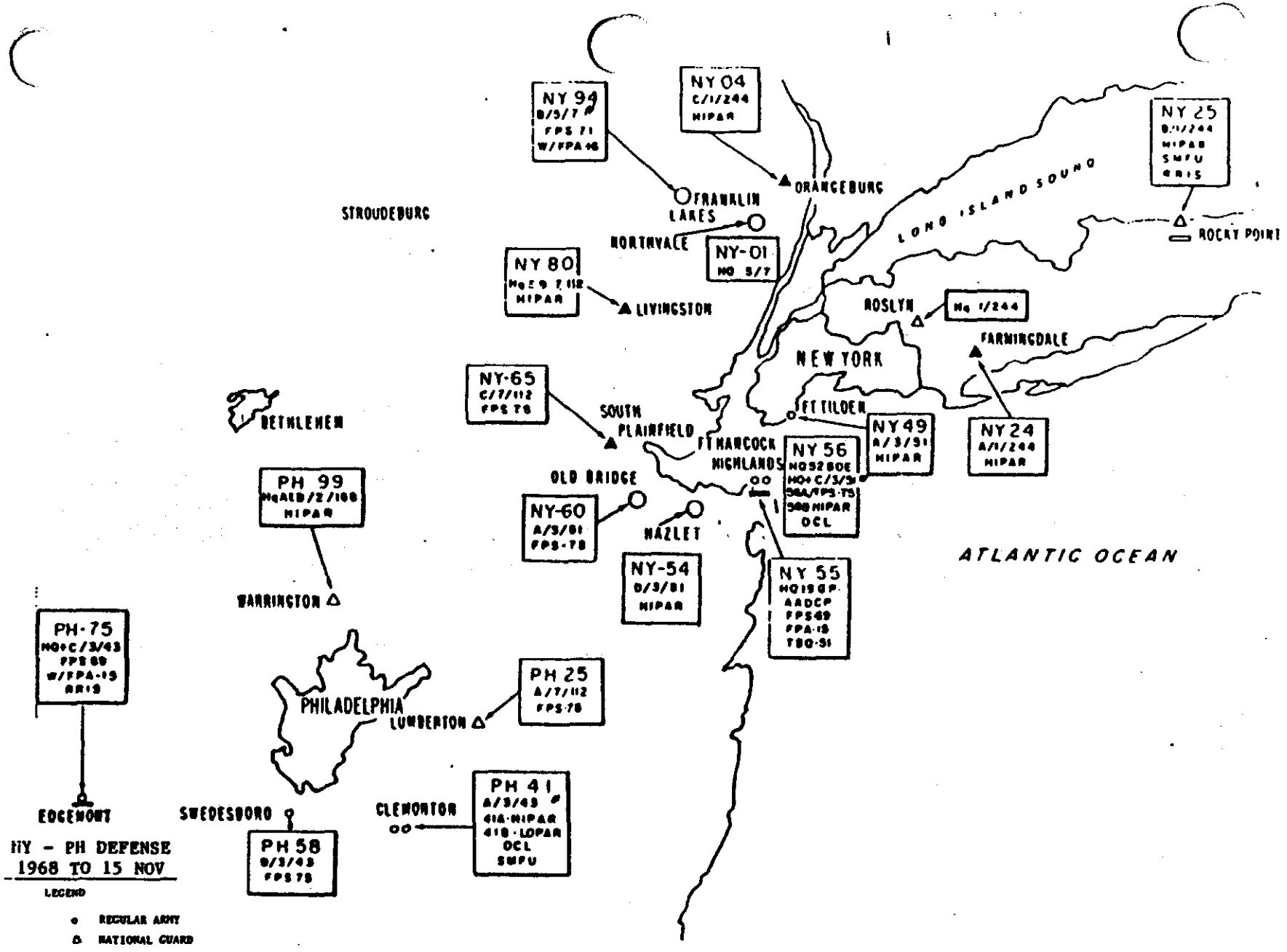
- ○ REGULAR ARMY
- △ NATIONAL GUARD
- ▬ AADCP
- ▭ RRIS

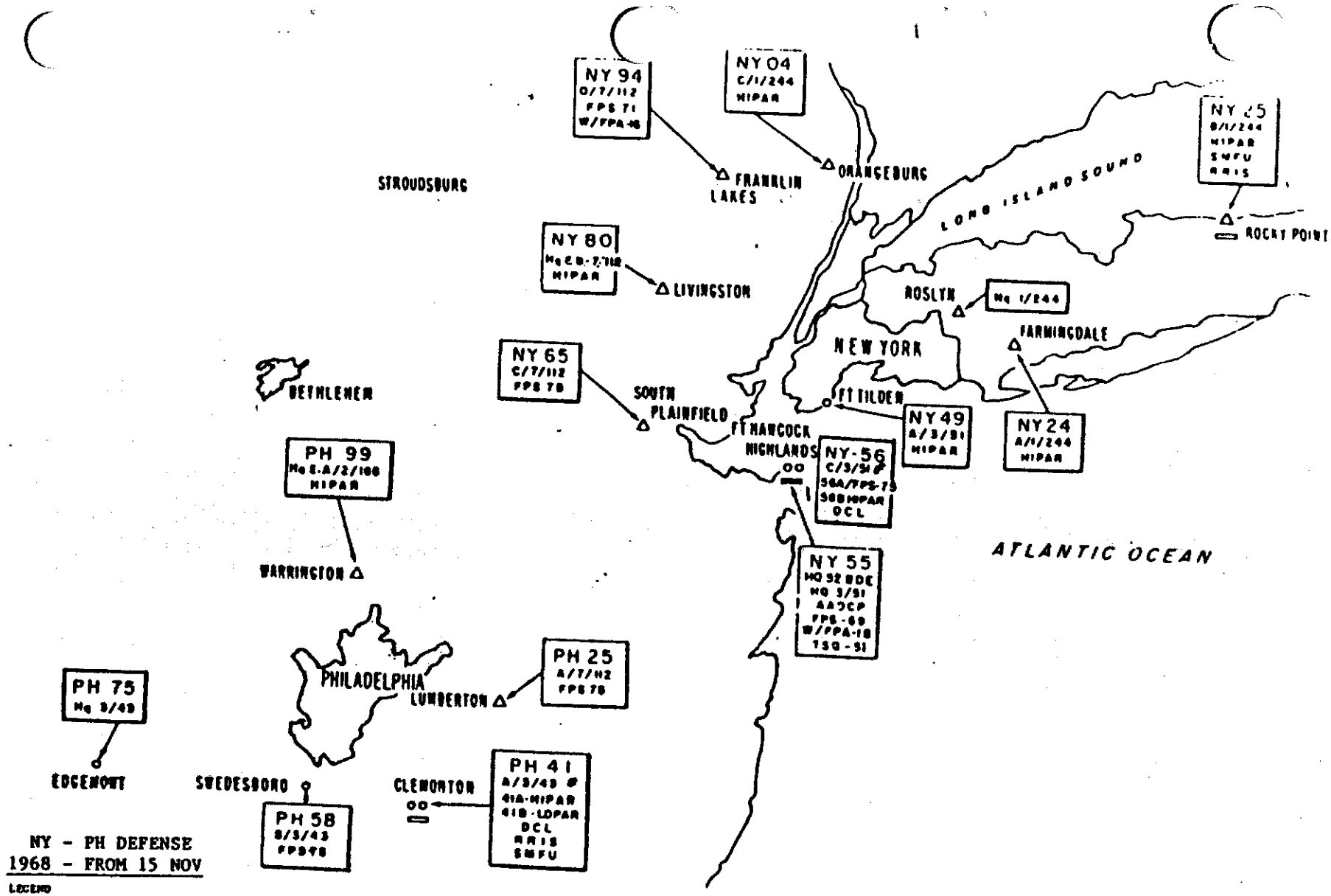


NEW ENGLAND DEFENSE
—— 1968-TO 15 NOV ——

LEGEND:

- ○ REGULAR ARMY
- △ NATIONAL GUARD
- AADCP
- ARIS


NY 94
B/3/7
FPS 71
W/FPA-16
NY 04
C/1/244
HIPAR
NY 25
B/1/244
HIPAR
SMFU
RRIS
ORANGEBURG
FRANKLIN LAKES
NORTHVALE
NY-01
HQ 5/7
STROUDEBURG
LONG ISLAND SOUND
ROCKY POINT
NY 80
HIPAR
LIVINGSTON
ROSLYN
FARMINGDALE
NEW YORK
NY-65
C/7/112
FPS 76
SOUTH PLAINFIELD
BETHLEHEM
FT TILDEN
NY 49
A/3/51
HIPAR
NY 24
A/1/244
HIPAR
FT HANCOCK
HIGHLANDS
NY 56
OCL
OLD BRIDGE
NY-60
A/3/81
FPS-78
HAZLET
PH 99
HIPAR
ATLANTIC OCEAN
NY-54
D/3/81
HIPAR
NY 55
AADCP
FPS-69
FPA-15
TBD-51
WARRINGTON
PH-75
HQ+C/3/43
FPS 89
W/FPA-15
RRIS
PH 25
A/7/112
FPS-76
PHILADELPHIA
LUMBERTON
EDGEMONT
SWEDESBORO
CLEMONTON
PH 41
A/3/43
41A-HIPAR
41B-LOPAR
OCL
SMFU
PH 58
D/3/43
FPS 78
NY - PH DEFENSE
1968 TO 15 NOV
LEGEND
REGULAR ARMY
NATIONAL GUARD
AADCP
DCL - DUAL CONTROL & LAUNCHER
RRIS
DOUBLE BATTERY
(2 NIKE-H FU)

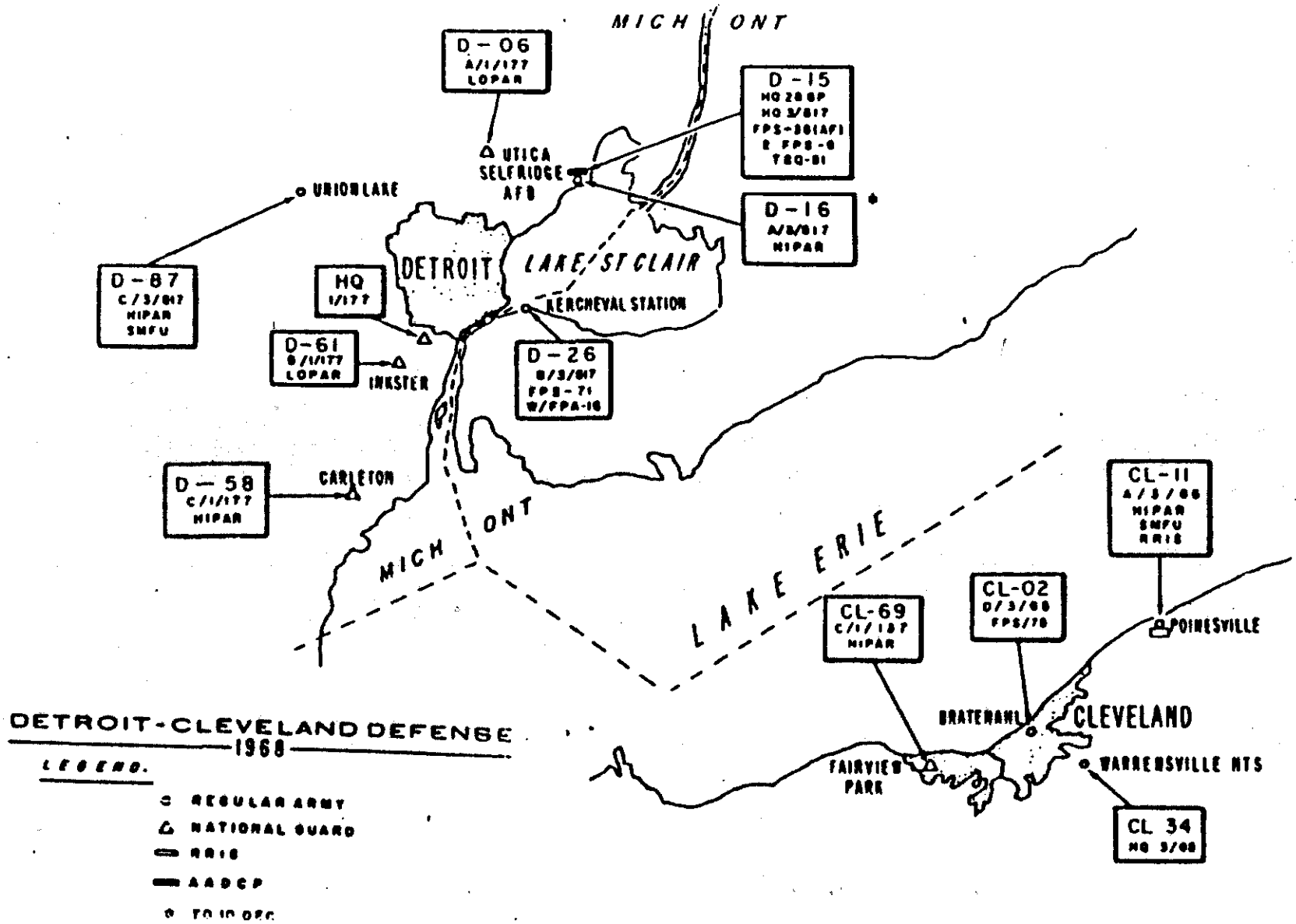


NY - PH DEFENSE
1968 - FROM 15 NOV

LEGEND

- ● REGULAR ARMY
- △ NATIONAL GUARD
- ▬ AADCP
- DCL - DUAL CONTROL & LAUNCHER
- ▭ RRIS
- # DOUBLE BATTERY (2 NIKE-H FU)

ORIGINAL (Red)



ORIGINAL
(Red)

ORIGINAL (Red)

APPENDIX C

GEOGRAPHIC AREAS OF RESPONSIBILITY FOR
ARAACOM, ARADCOM, AND NORAD FOR THE
PERIOD 1950 TO 1973

"NOTICE:

The documents contained in this Appendix have been reproduced from the best copies available. Although certain portions are illegible, this material is being released in the interest of making available as much information as possible.

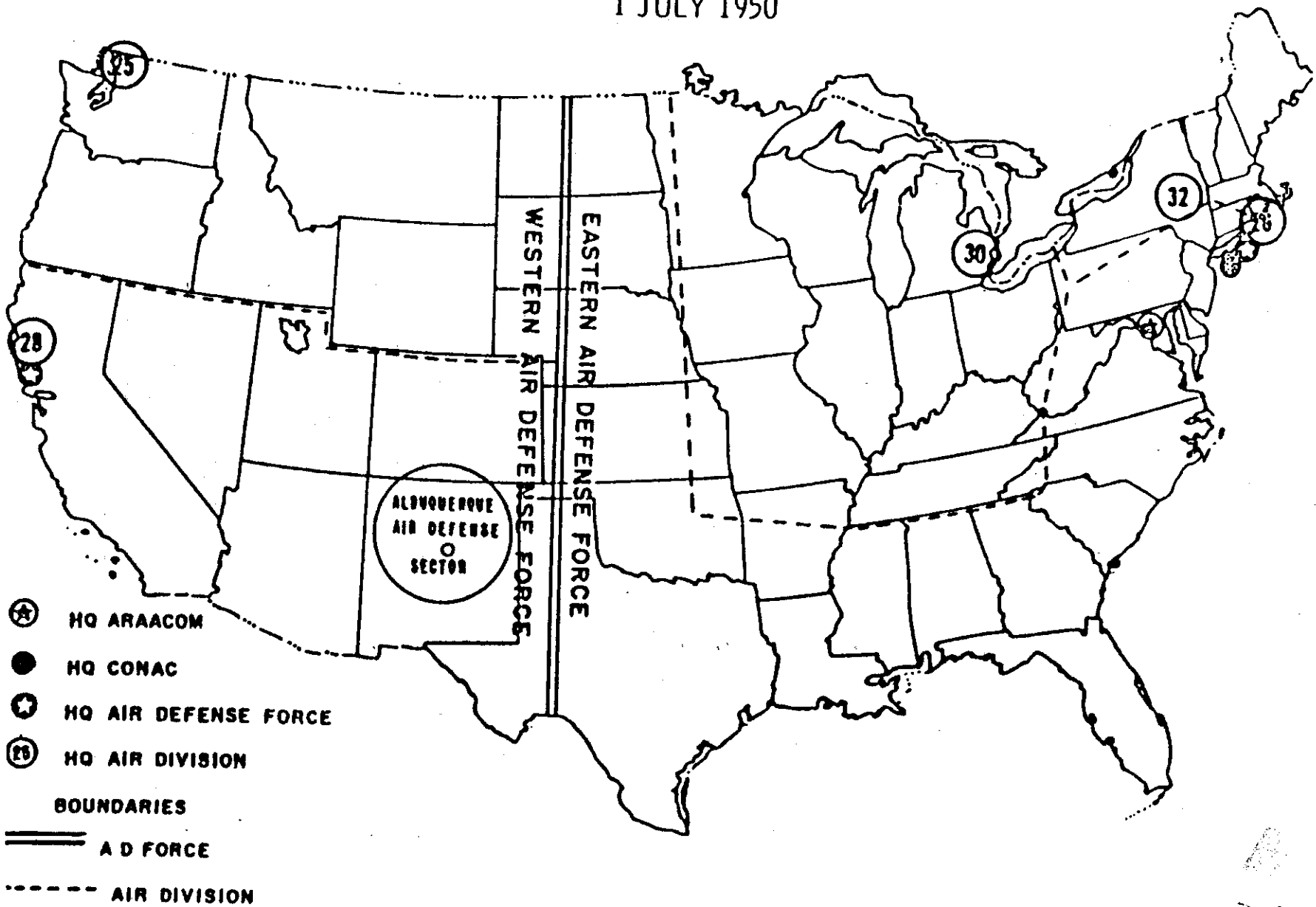
ORIGINAL (Red)

APPENDIX C

GEOGRAPHIC AREAS OF RESPONSIBILITY FOR ARAACOM, ARADCOM, AND NORAD FOR THE PERIOD 1950 TO 1973

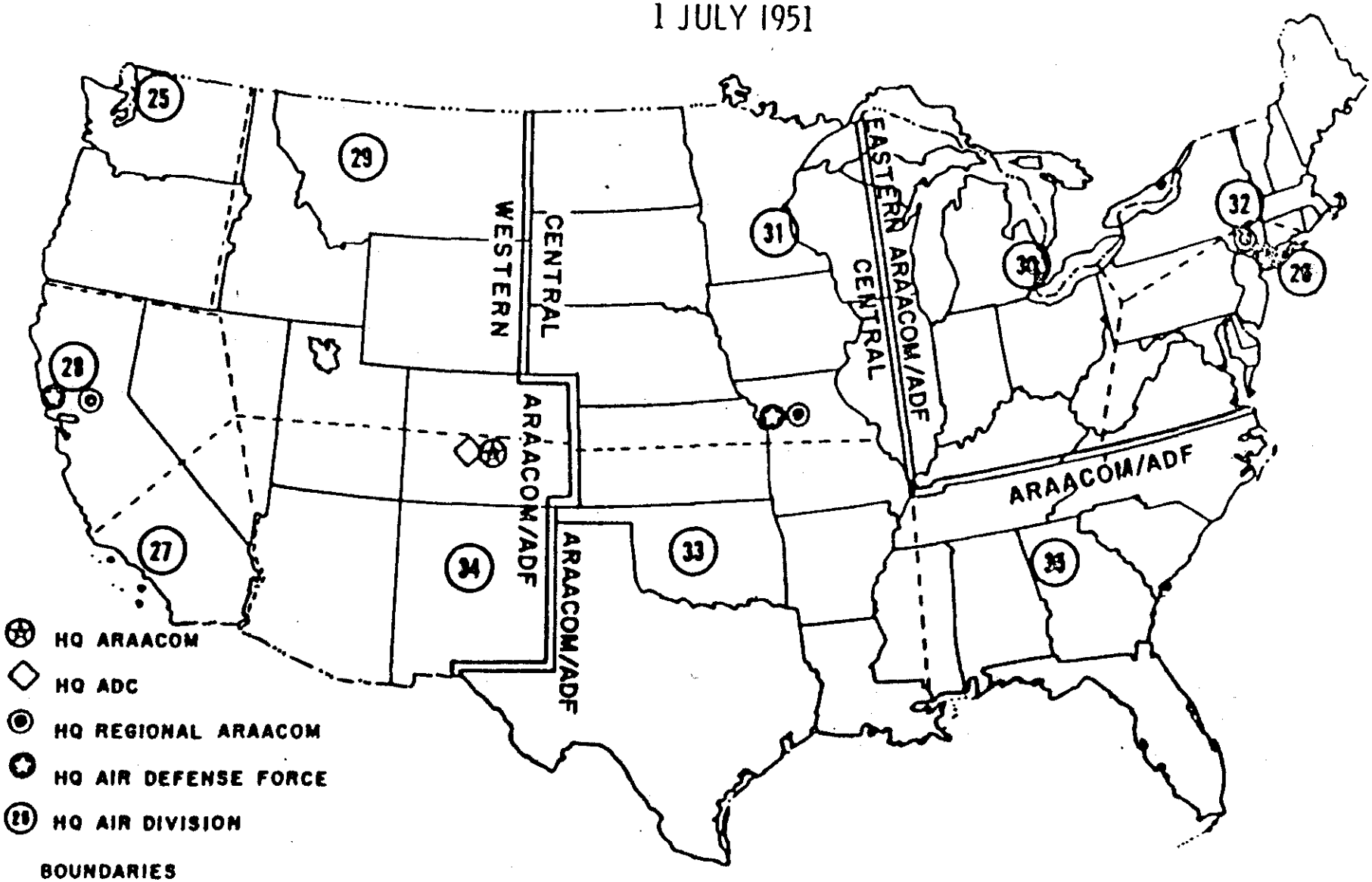
The maps presented in this section show the different administrative regions which existed within ARAACOM during the Nike program. The variation illustrated may be one of the main reasons why no significant regional differences in battery operations were found. Regional boundaries changed so frequently that administrative control of many individual batteries shifted annually. This would necessarily inhibit evolution of "regional" procedures, since no administrative framework remained in place for an extended period.

1 JULY 1950



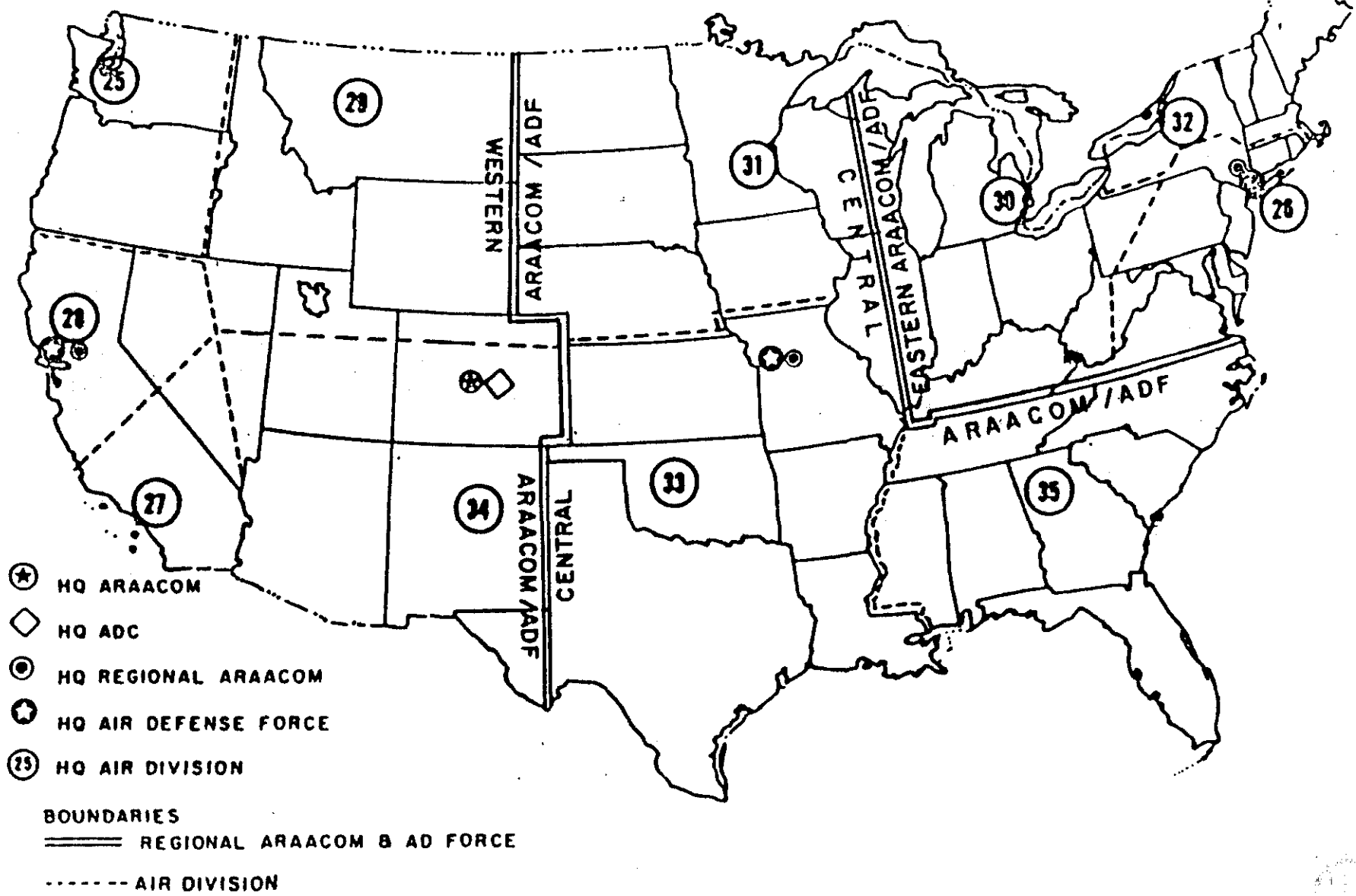
HEADQUARTERS AND AREAS OF RESPONSIBILITY (CONUS)

1 JULY 1951



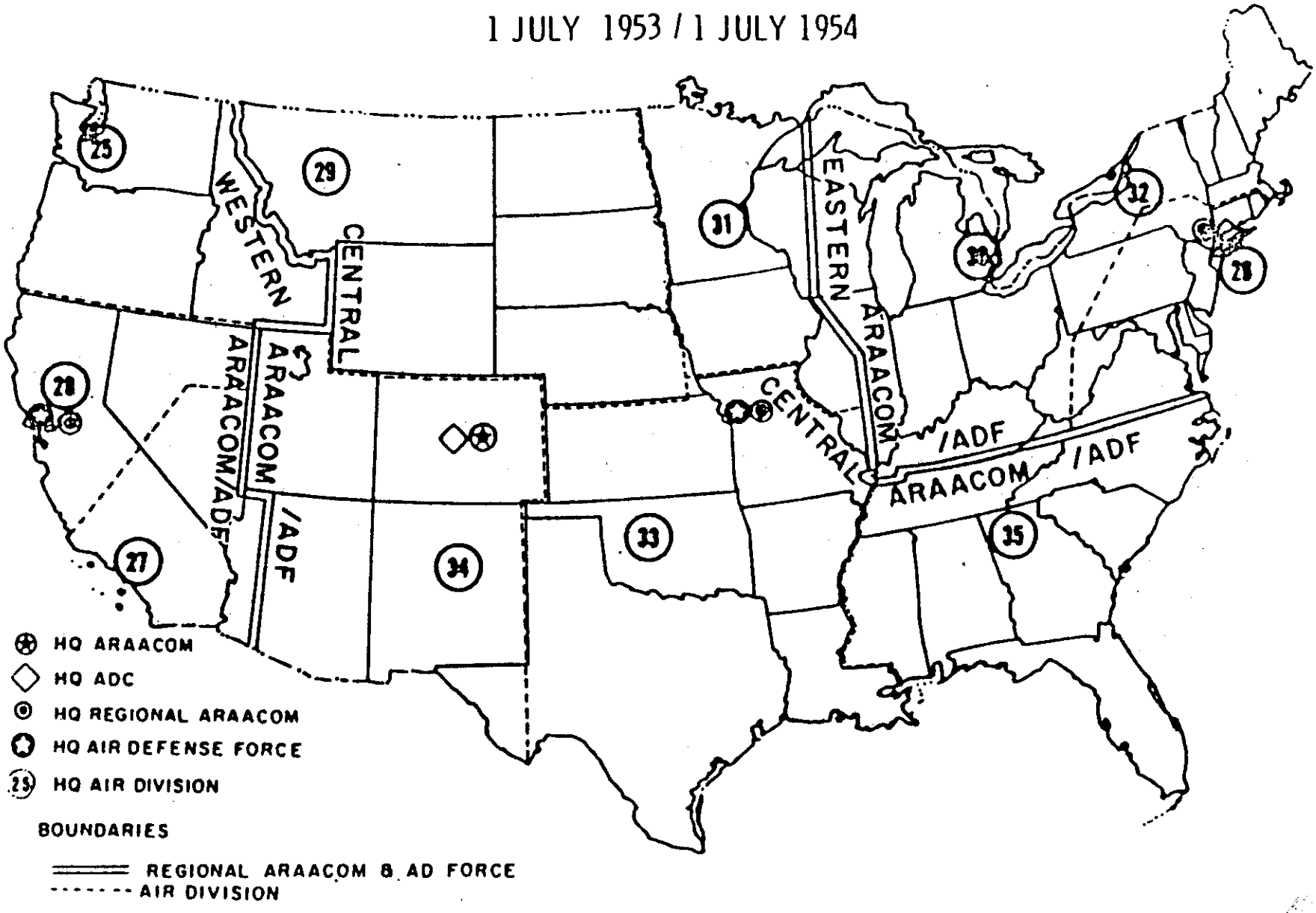
HEADQUARTERS AND AREAS OF RESPONSIBILITY (CONUS)

1 JULY 1952



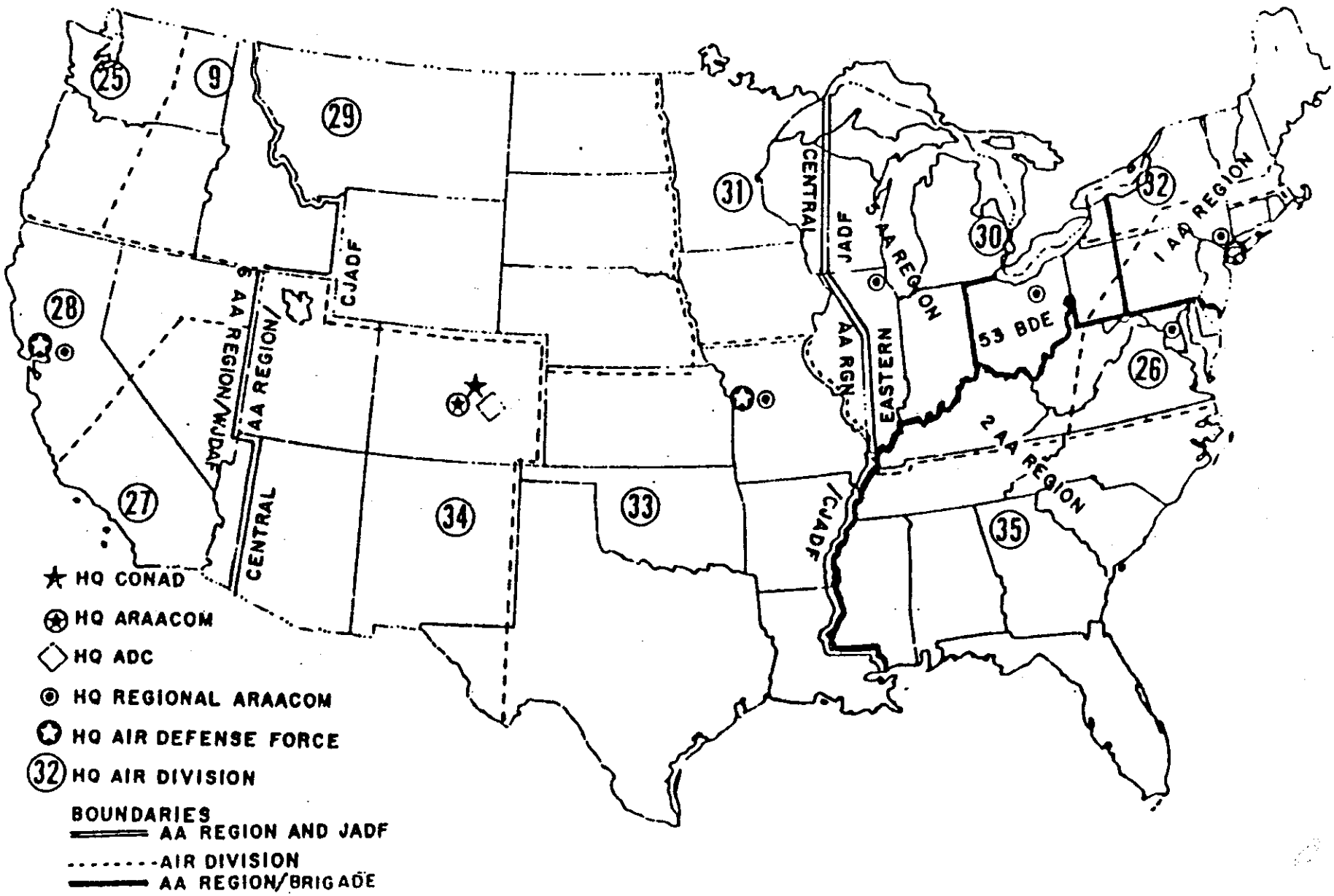
HEADQUARTERS AND AREAS OF RESPONSIBILITY (CONUS)

1 JULY 1953 / 1 JULY 1954



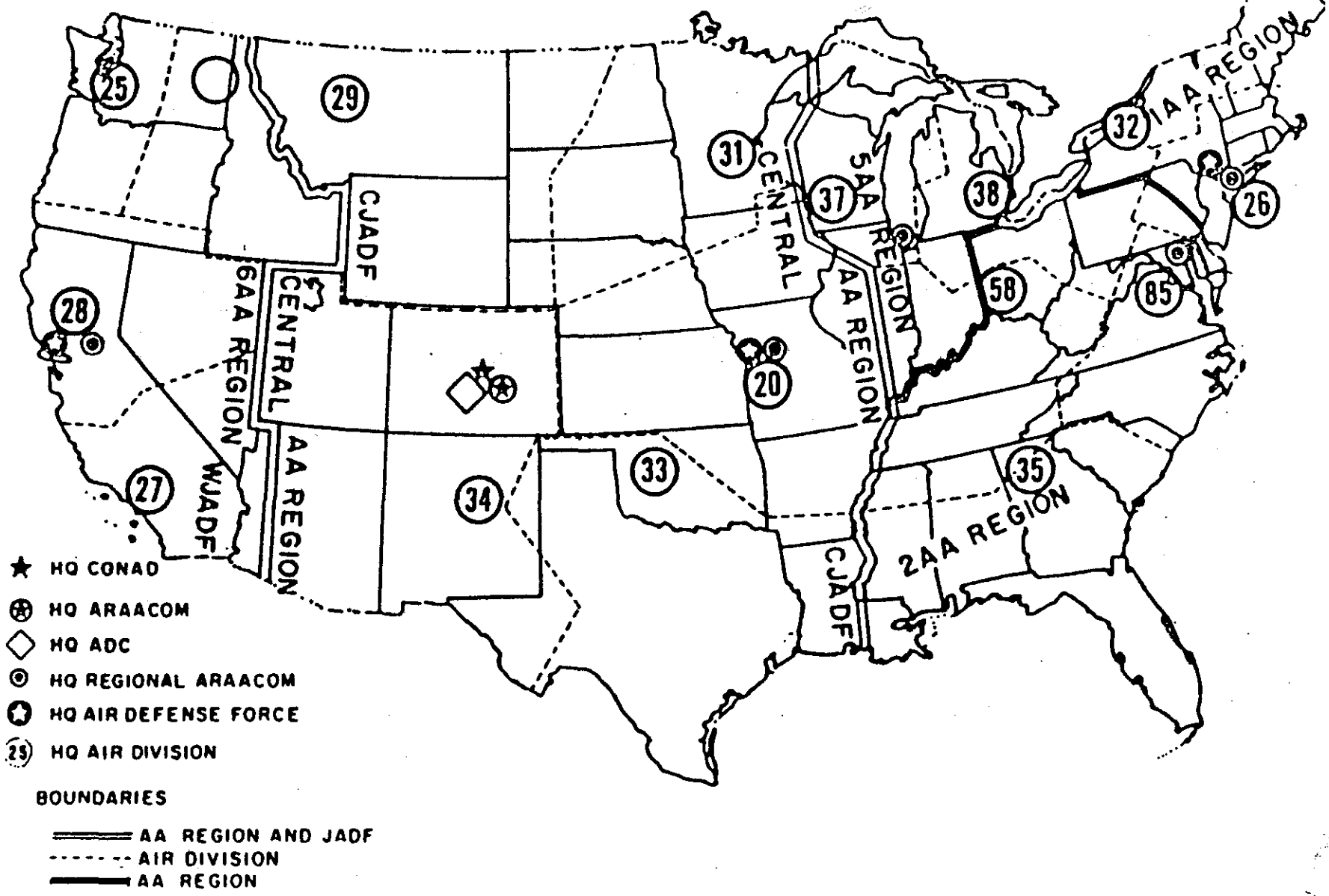
HEADQUARTERS AND AREAS OF RESPONSIBILITY (CONUS)

1 JULY 1955



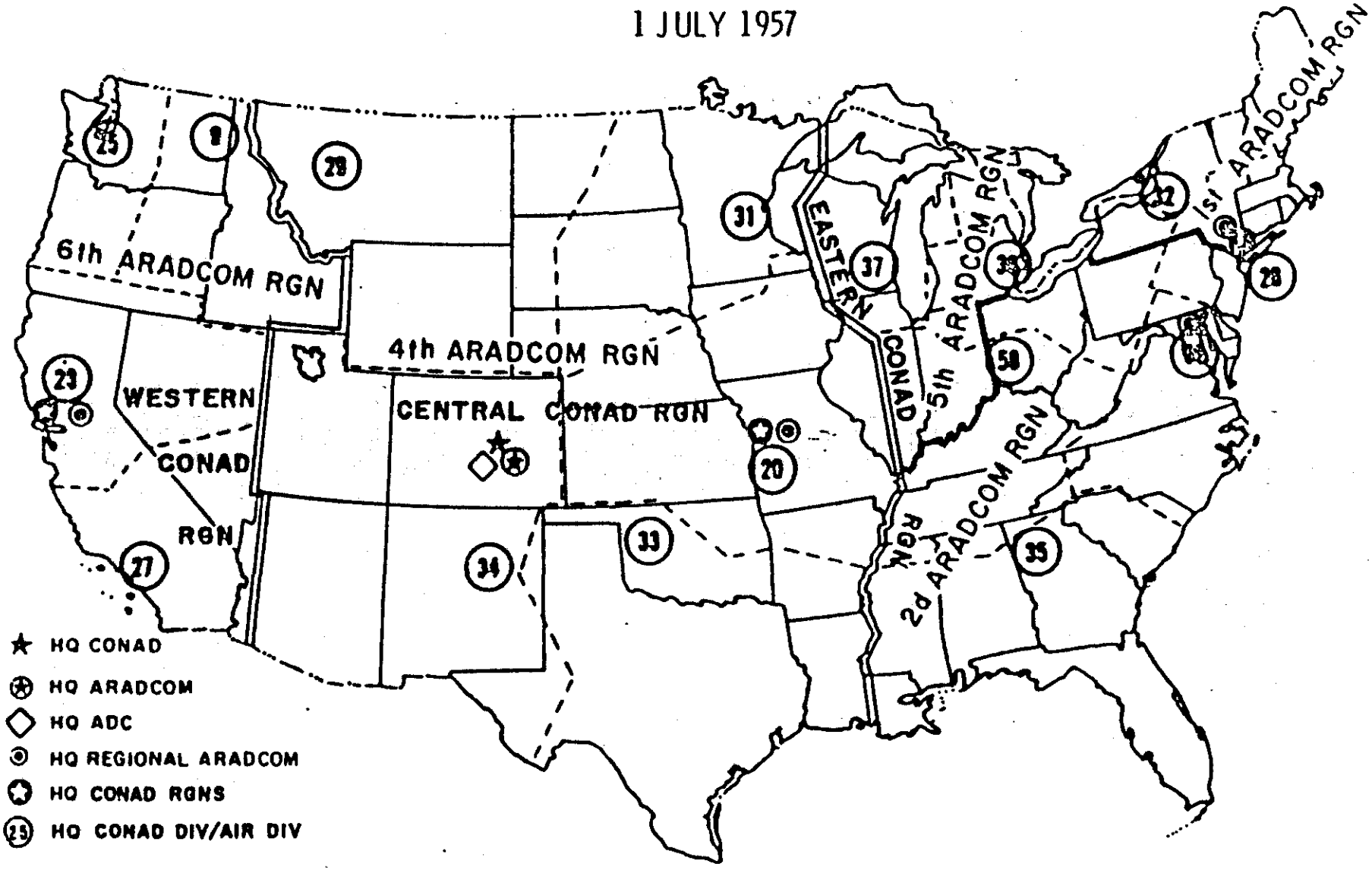
HEADQUARTERS AND AREAS OF RESPONSIBILITY (CONUS)

1 JULY 1956



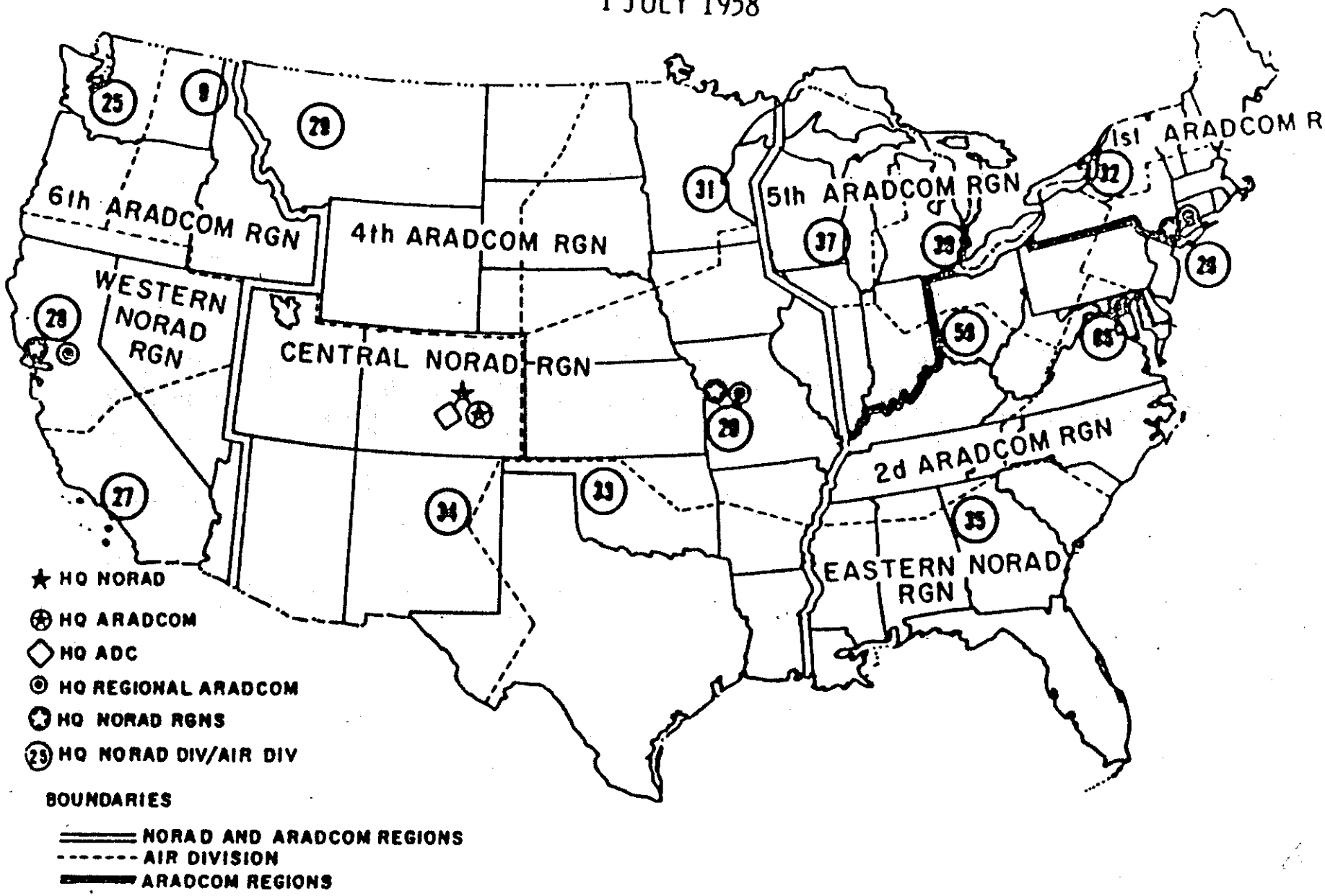
HEADQUARTERS AND AREAS OF RESPONSIBILITY (CONUS)

1 JULY 1957



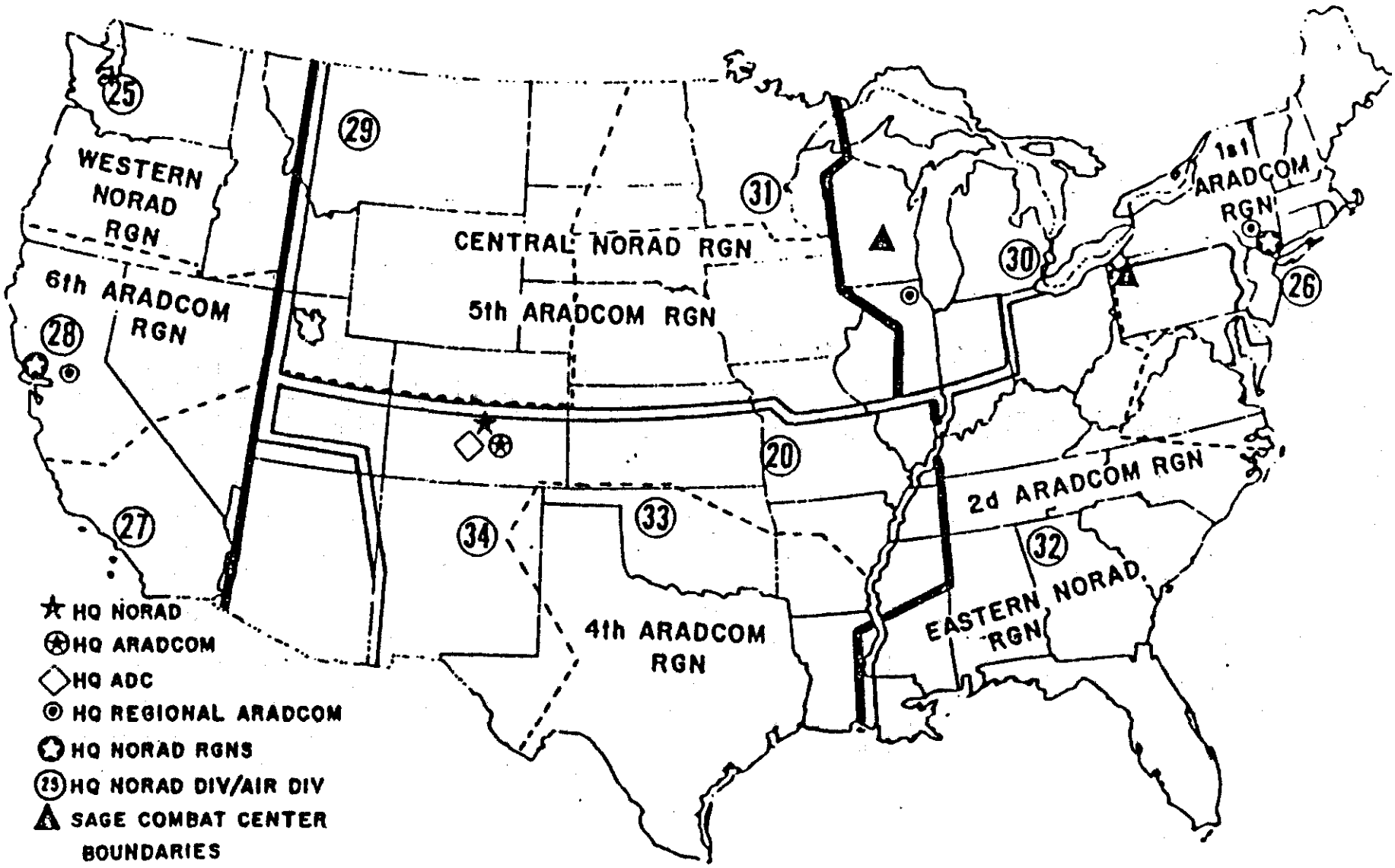
HEADQUARTERS AND AREAS OF RESPONSIBILITY (CONUS)

1 JULY 1958



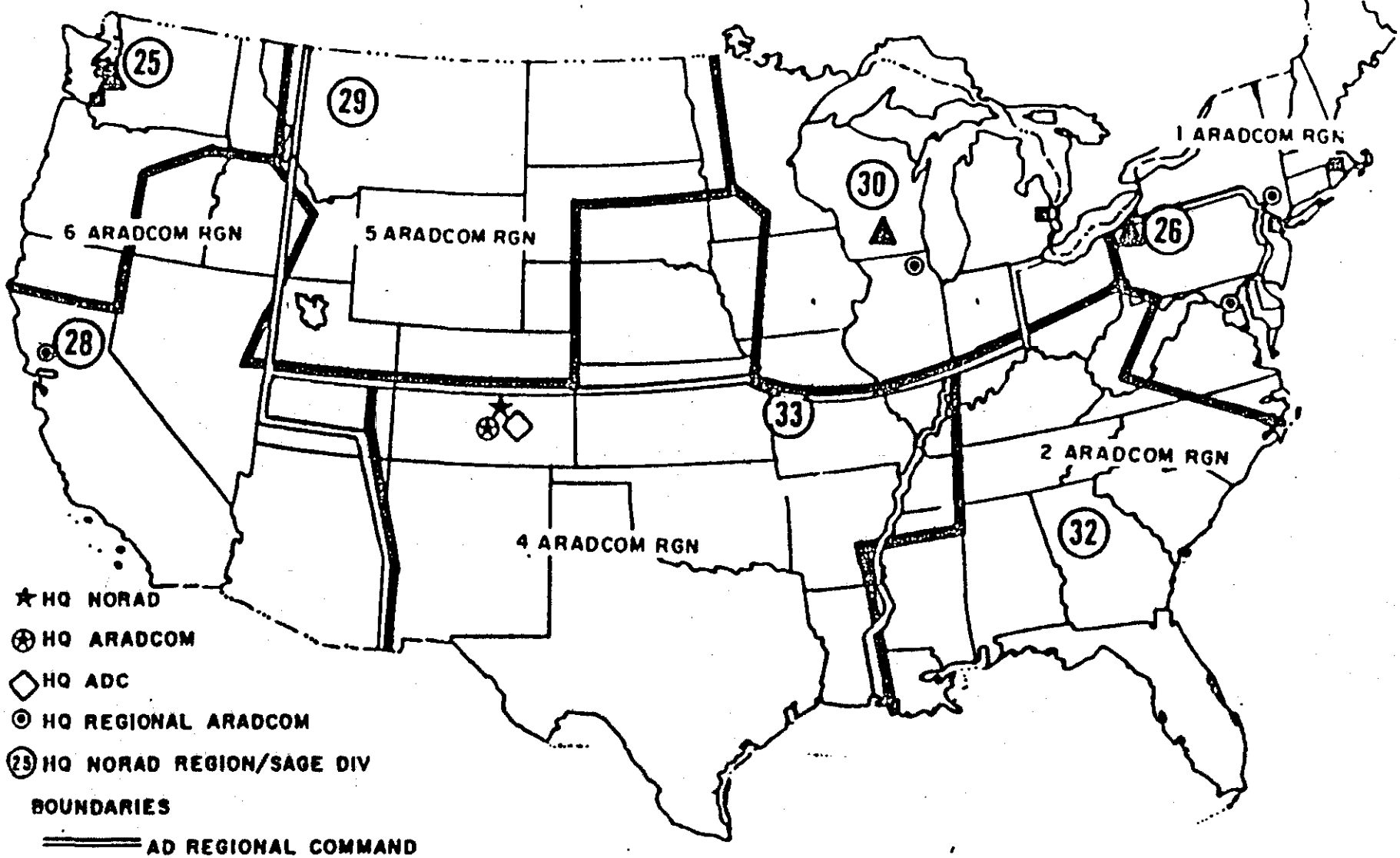
HEADQUARTERS AND AREAS OF RESPONSIBILITY (CONUS)

1 JULY 1959



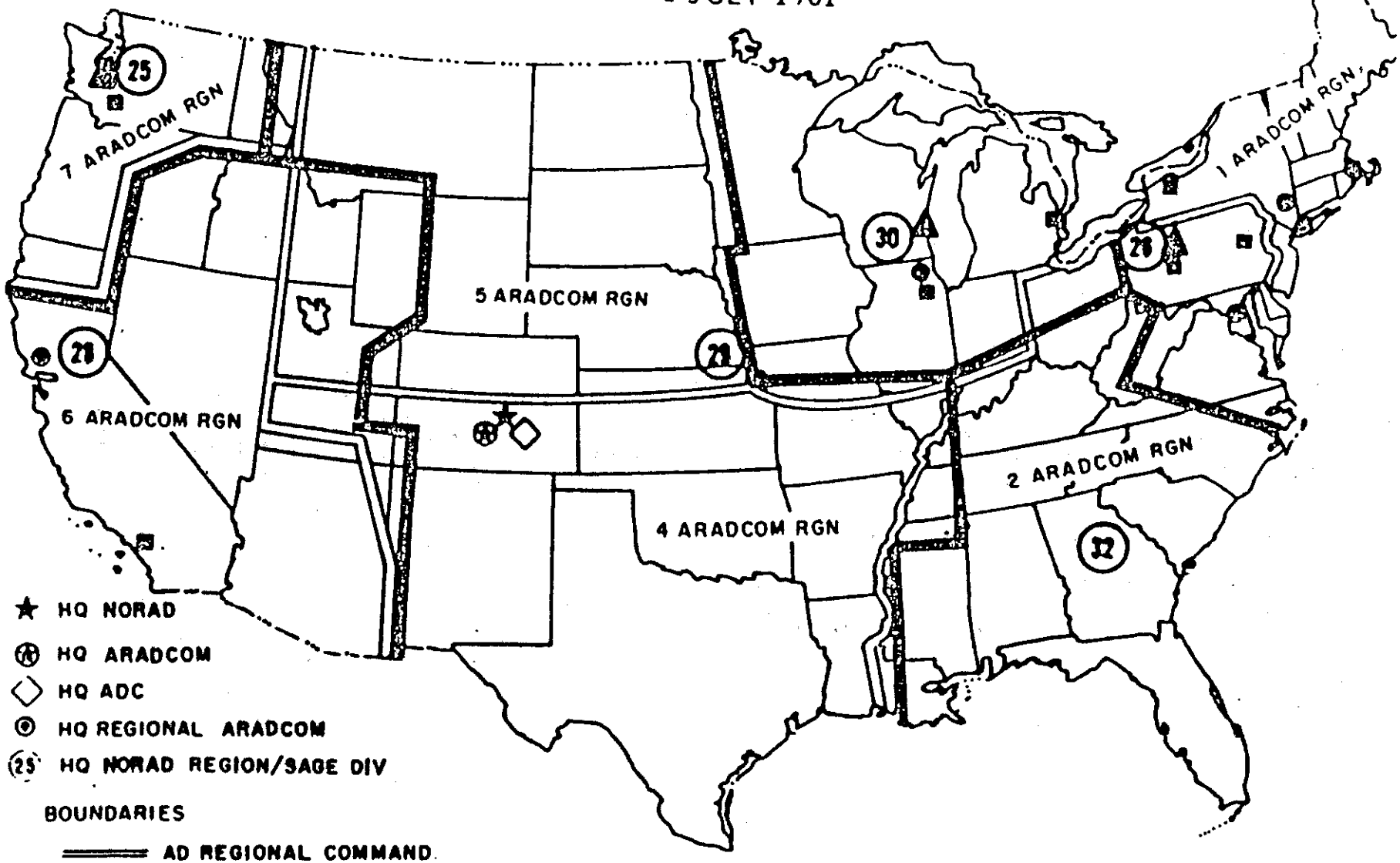
HEADQUARTERS AND AREAS OF RESPONSIBILITY (CONUS)

1 JULY 1960



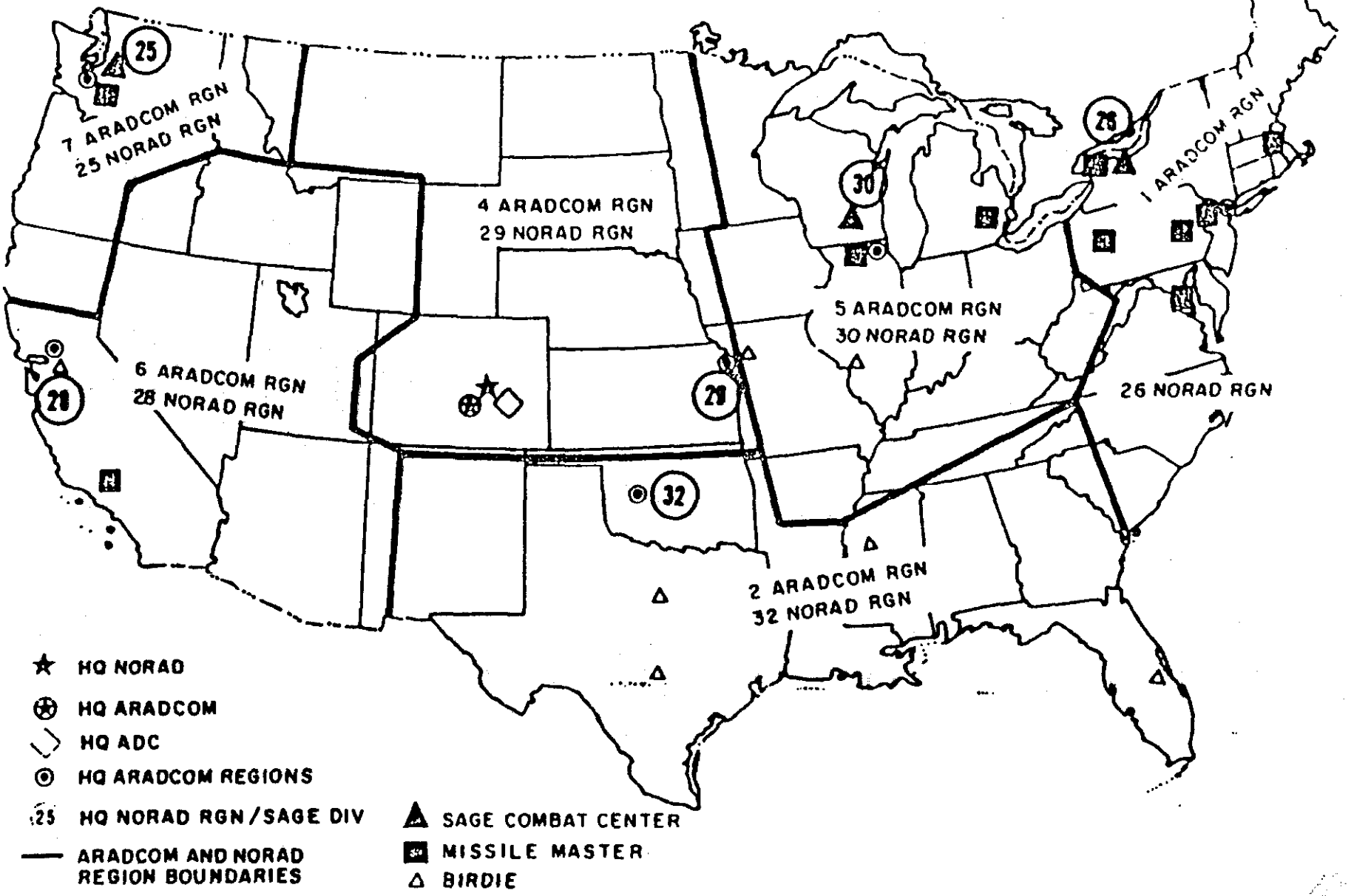
HEADQUARTERS AND AREAS OF RESPONSIBILITY (CONUS)

1 JULY 1961

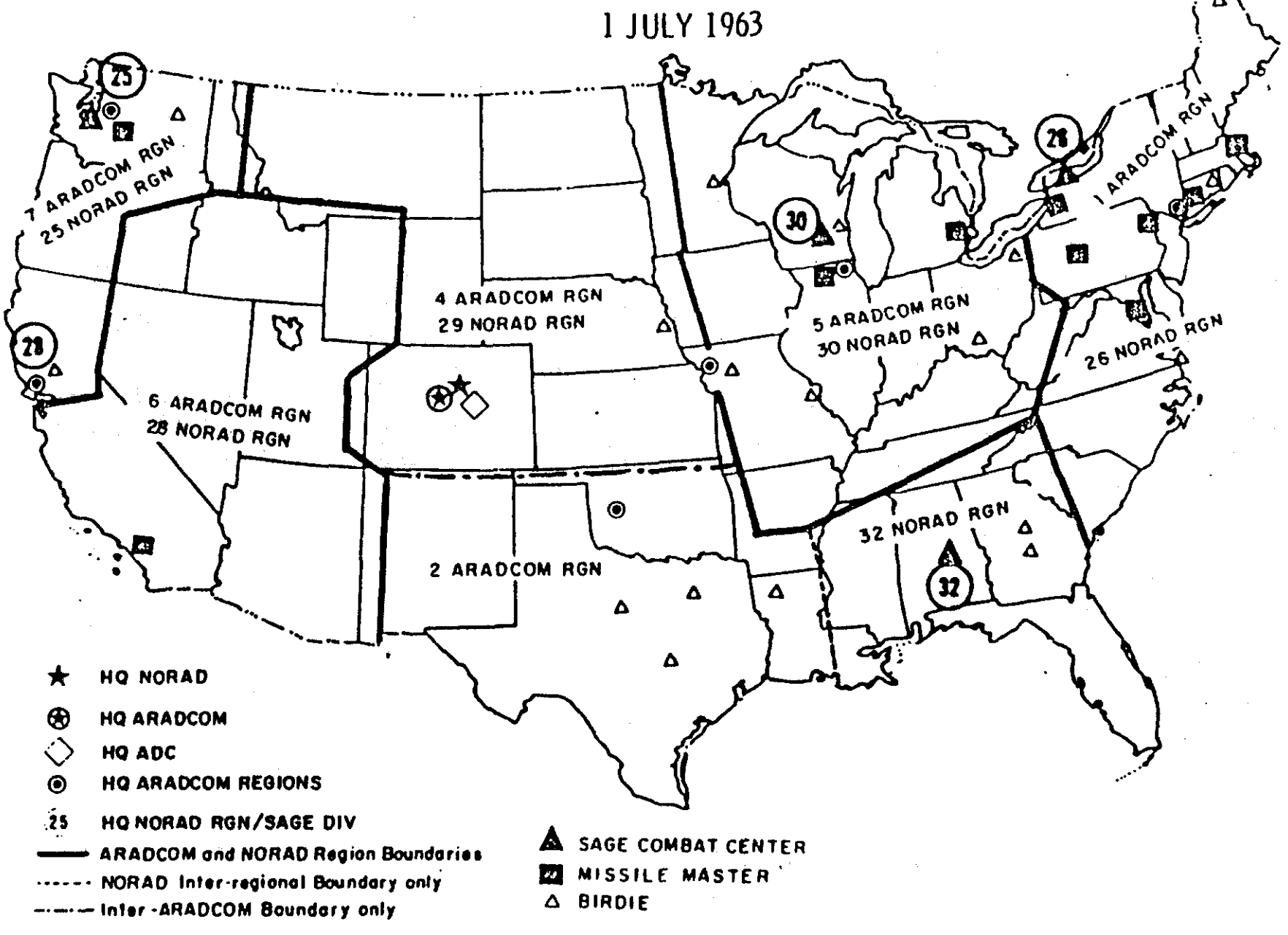


HEADQUARTERS AND AREAS OF RESPONSIBILITY (CONUS)

1 JULY 1962

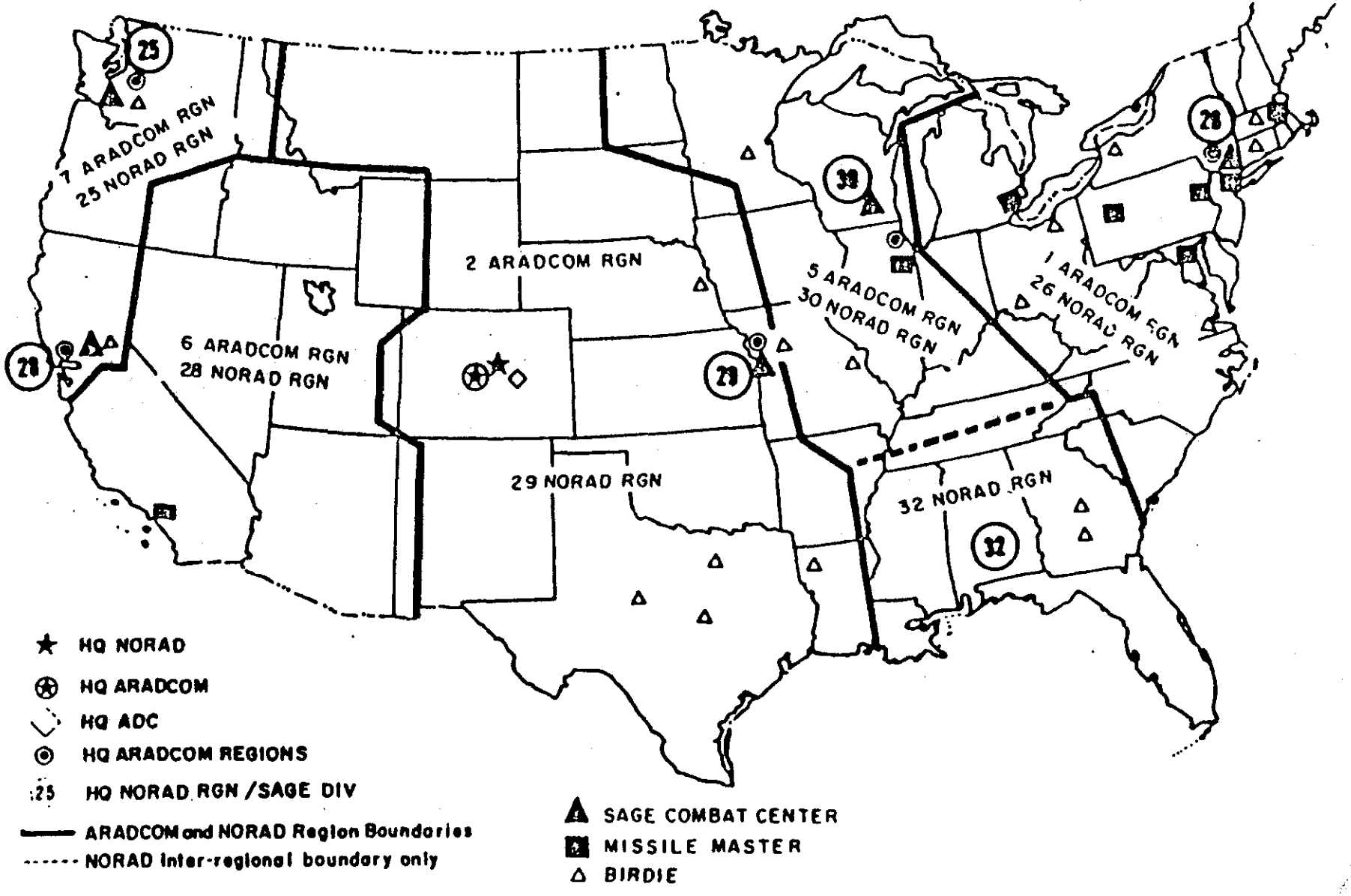


HEADQUARTERS AND AREAS OF RESPONSIBILITY (CONUS)

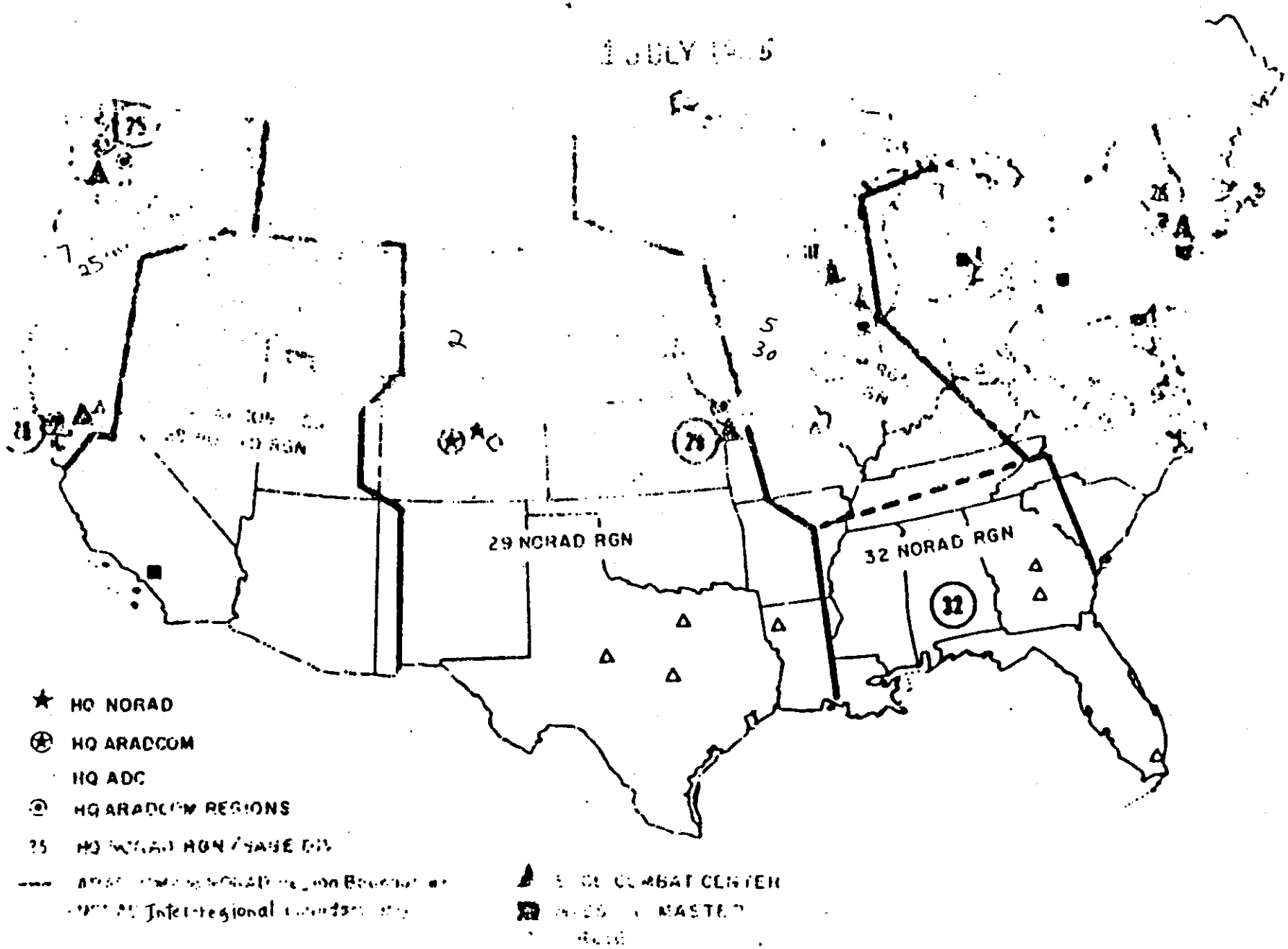


HEADQUARTERS AND AREAS OF RESPONSIBILITY (CONUS)

1 JULY 1964

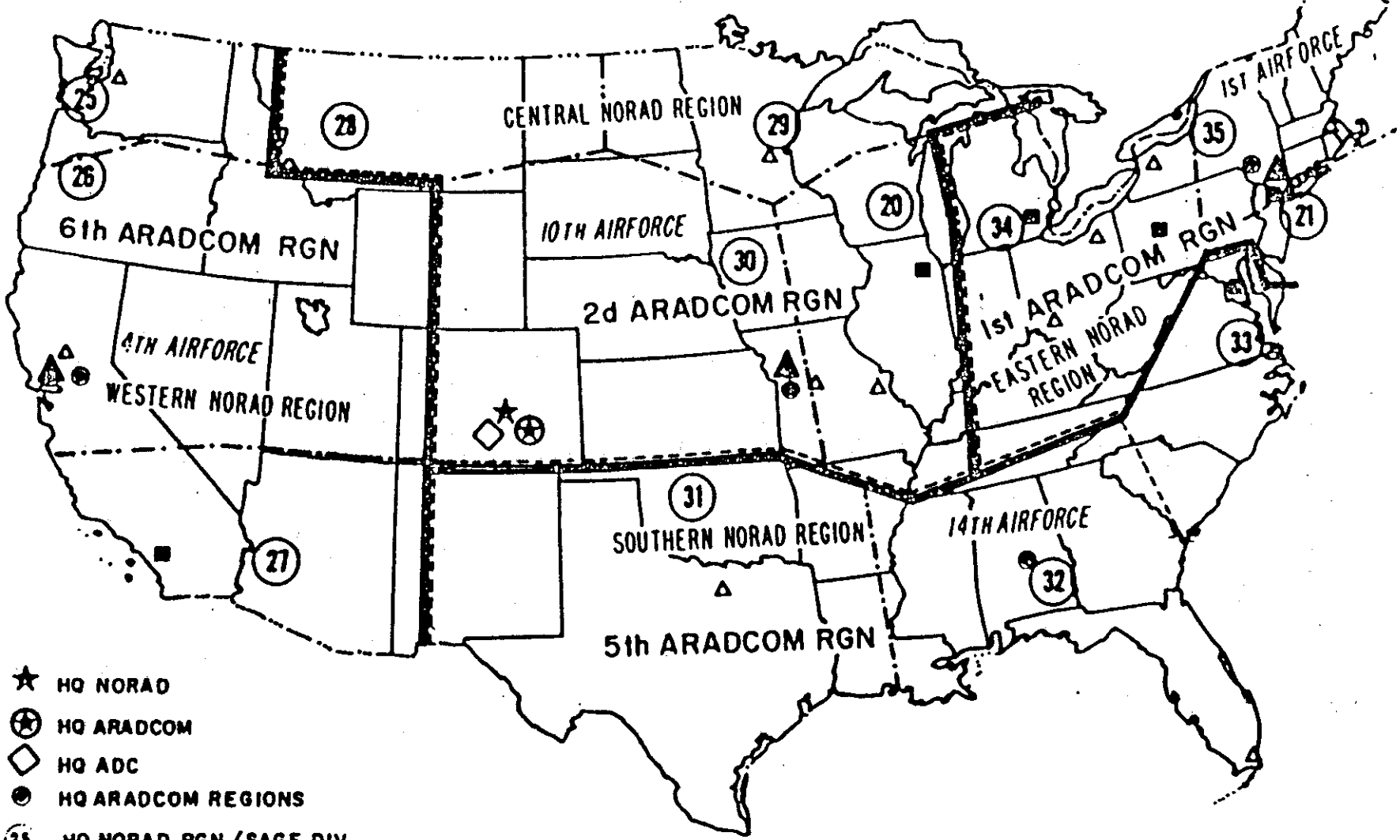


HEADQUARTERS AND AREAS OF RESPONSIBILITY (CONUS)



HEADQUARTERS AND AREAS OF RESPONSIBILITY (CONUS)

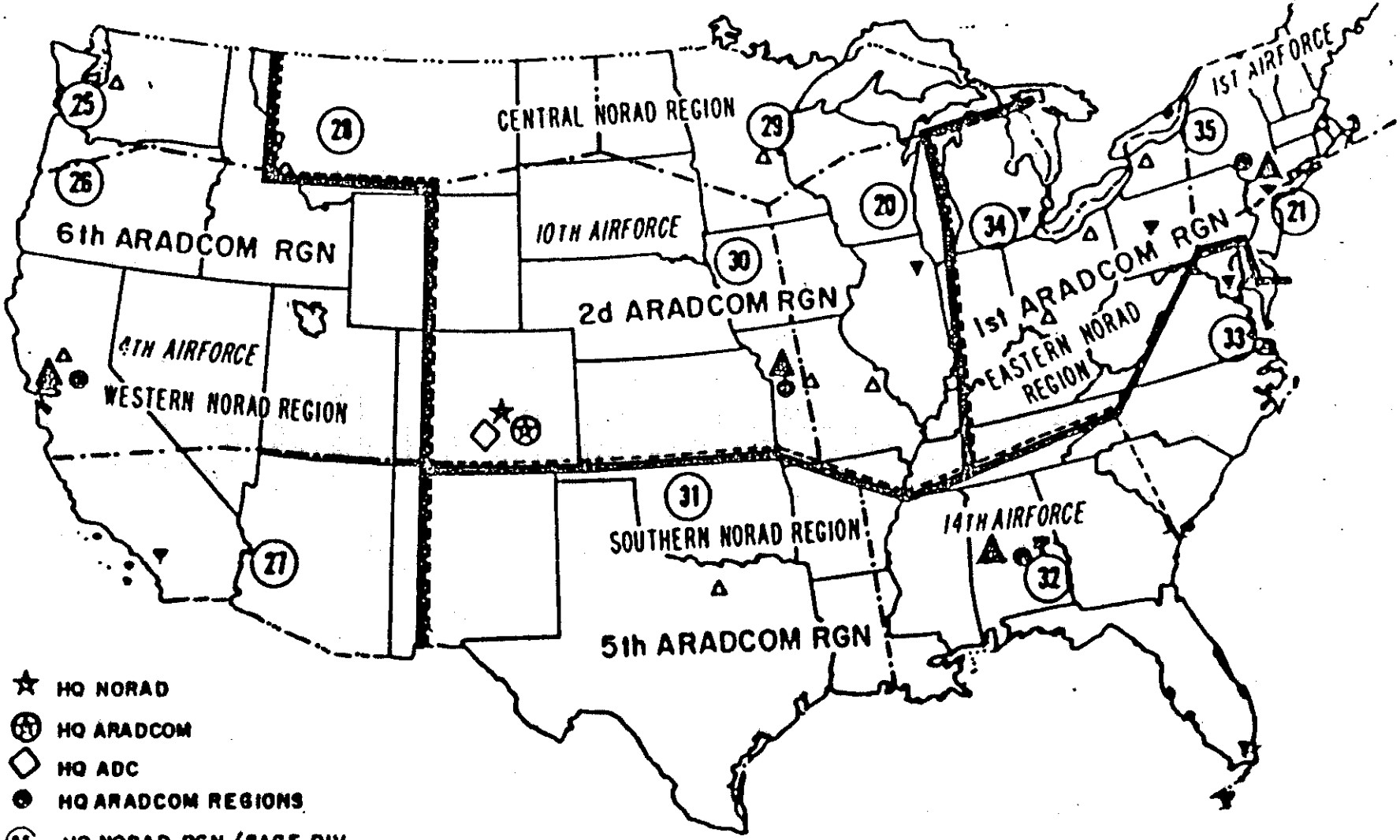
1 JULY 1966



- HQ NORAD
- HQ ARADCOM
- HQ ADC
- HQ ARADCOM REGIONS
- 25 HQ NORAD RGN / SAGE DIV
- INTER-ARADCOM BOUNDARY
- NORAD Inter-regional/ADC Inter-air force boundary
- NORAD Divisional Boundary
- SAGE COMBAT CENTER
- MISSILE MASTER
- BIRDIE

HEADQUARTERS AND AREAS OF RESPONSIBILITY (CONUS)

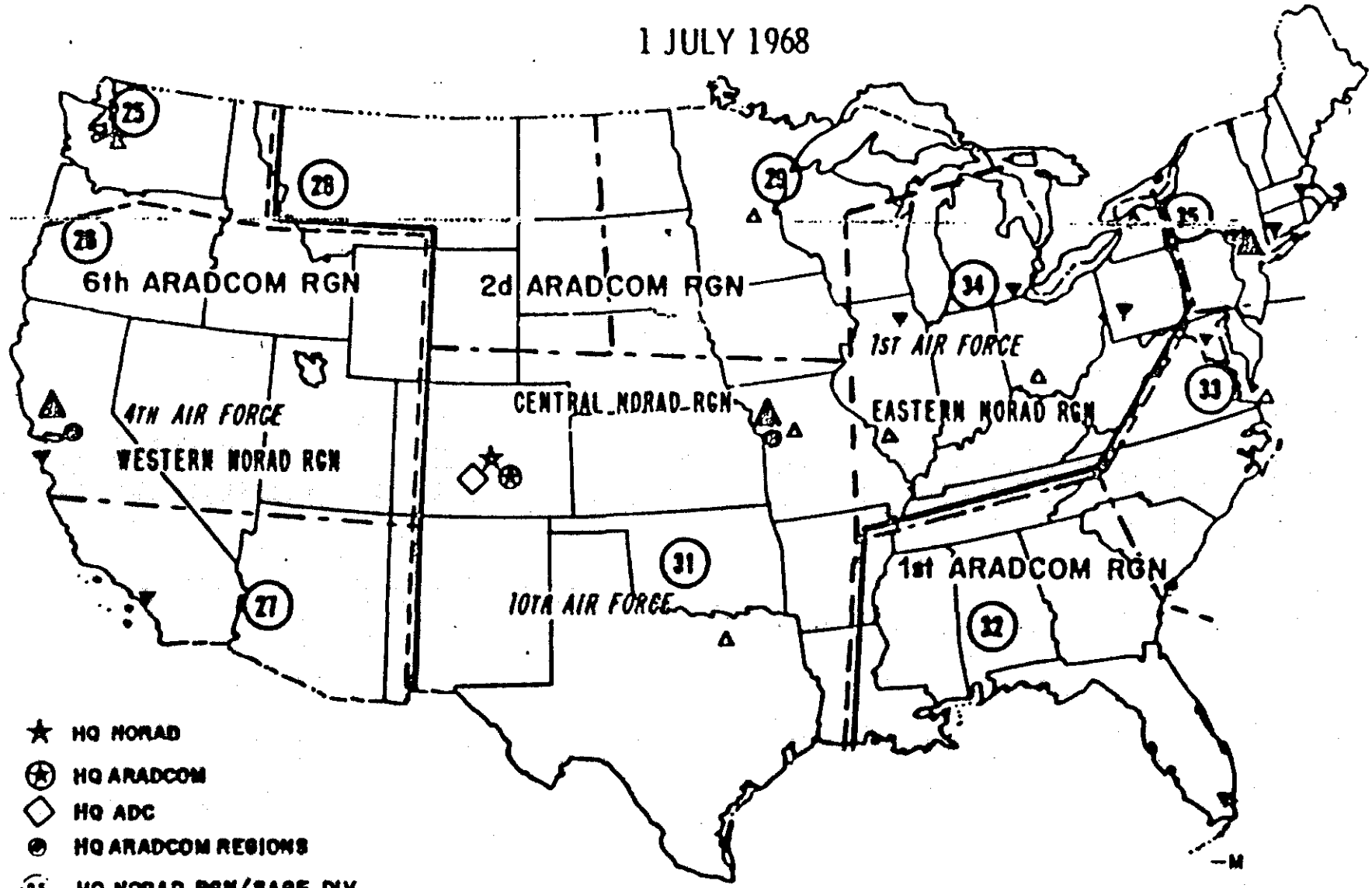
1 JULY 1967



- HQ NORAD
- HQ ARADCOM
- HQ ADC
- HQ ARADCOM REGIONS
- HQ NORAD RGN / SAGE DIV
- INTER-ARADCOM BOUNDARY
- NORAD Inter-regional/ADC Inter-air force boundary
- NORAD Divisional Boundary
- SAGE COMBAT CENTER
- BIRDIE
- AN/TSQ-51 (MISSILE MENTOR)
- AN/TSQ-38

HEADQUARTERS AND AREAS OF RESPONSIBILITY (CONUS)

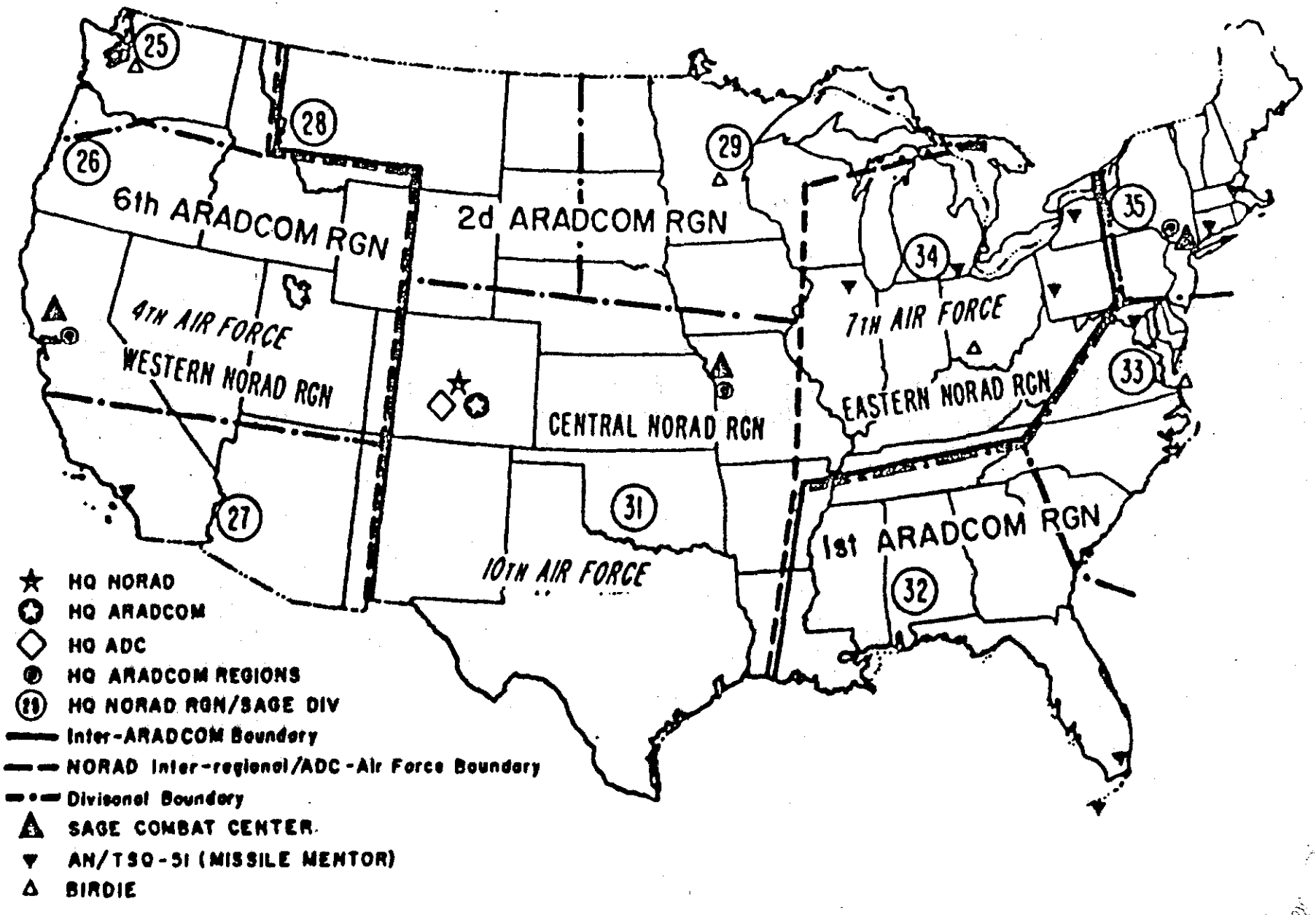
1 JULY 1968



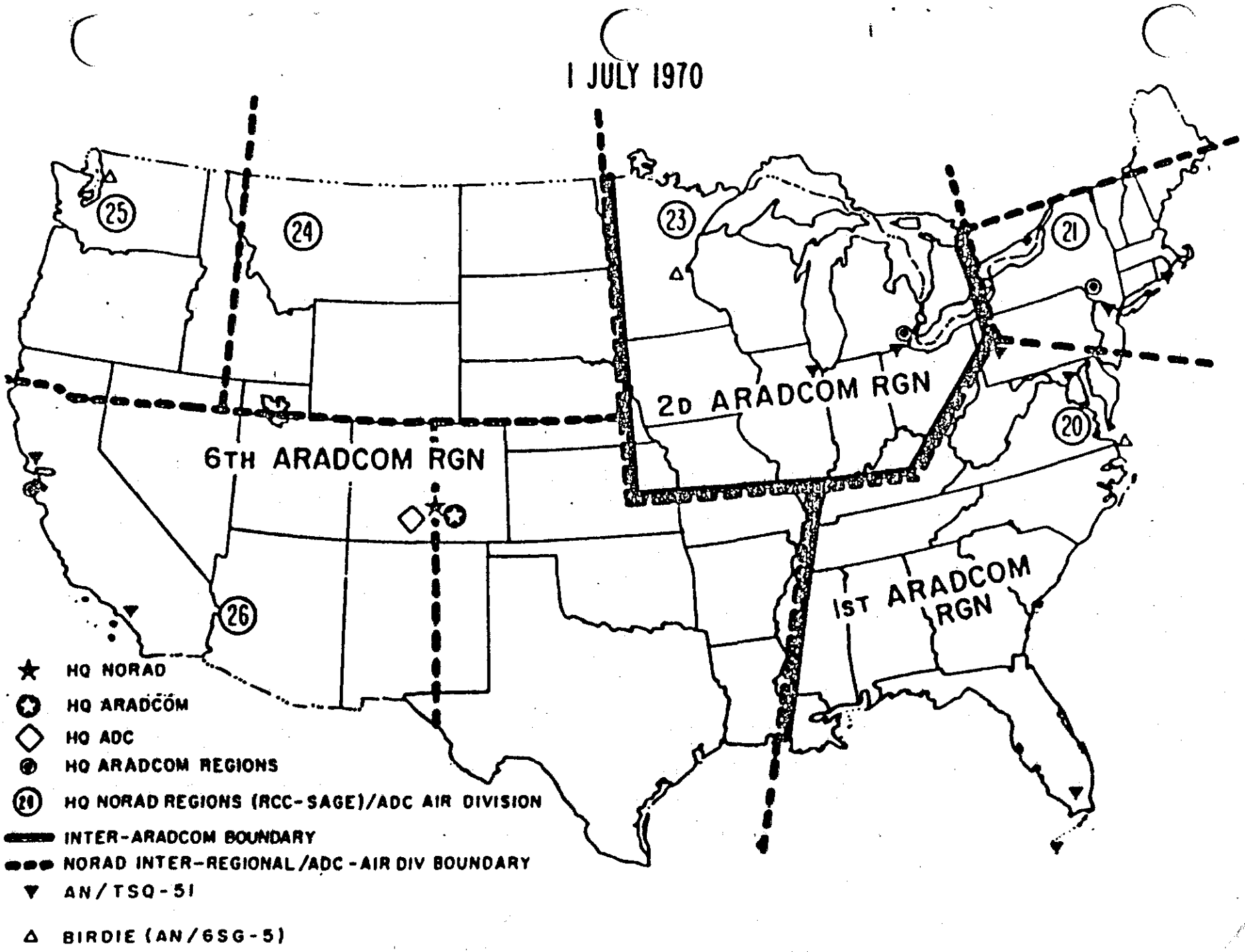
★ HQ NORAD
HQ ARADCOM
HQ ADC
HQ ARADCOM REGIONS
25 HQ NORAD RGN/SAGE DIV
Inter-ARADCOM Boundary
NORAD Inter-regional/ADC-Air Force Boundary
Divisional Boundary
SAGE COMBAT CENTER
▼ AN/TSQ-51 (MISSILE MENTOR)
△ BIRDIE
M MANUAL (1 MAY-1 OCT)

HEADQUARTERS AND AREAS OF RESPONSIBILITY (CONUS)

1 JULY 1969



HEADQUARTERS AND AREAS OF RESPONSIBILITY (CONUS)



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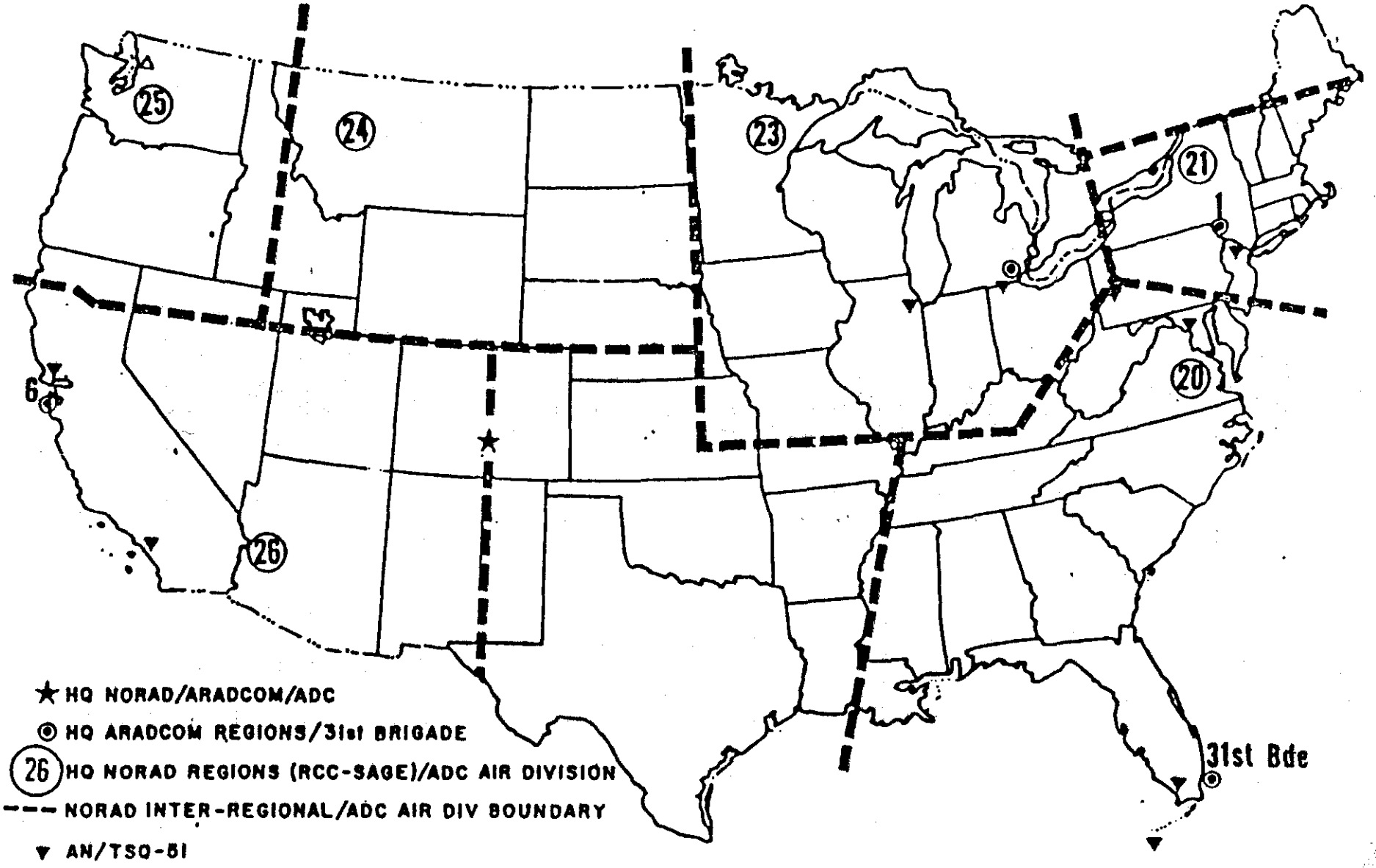

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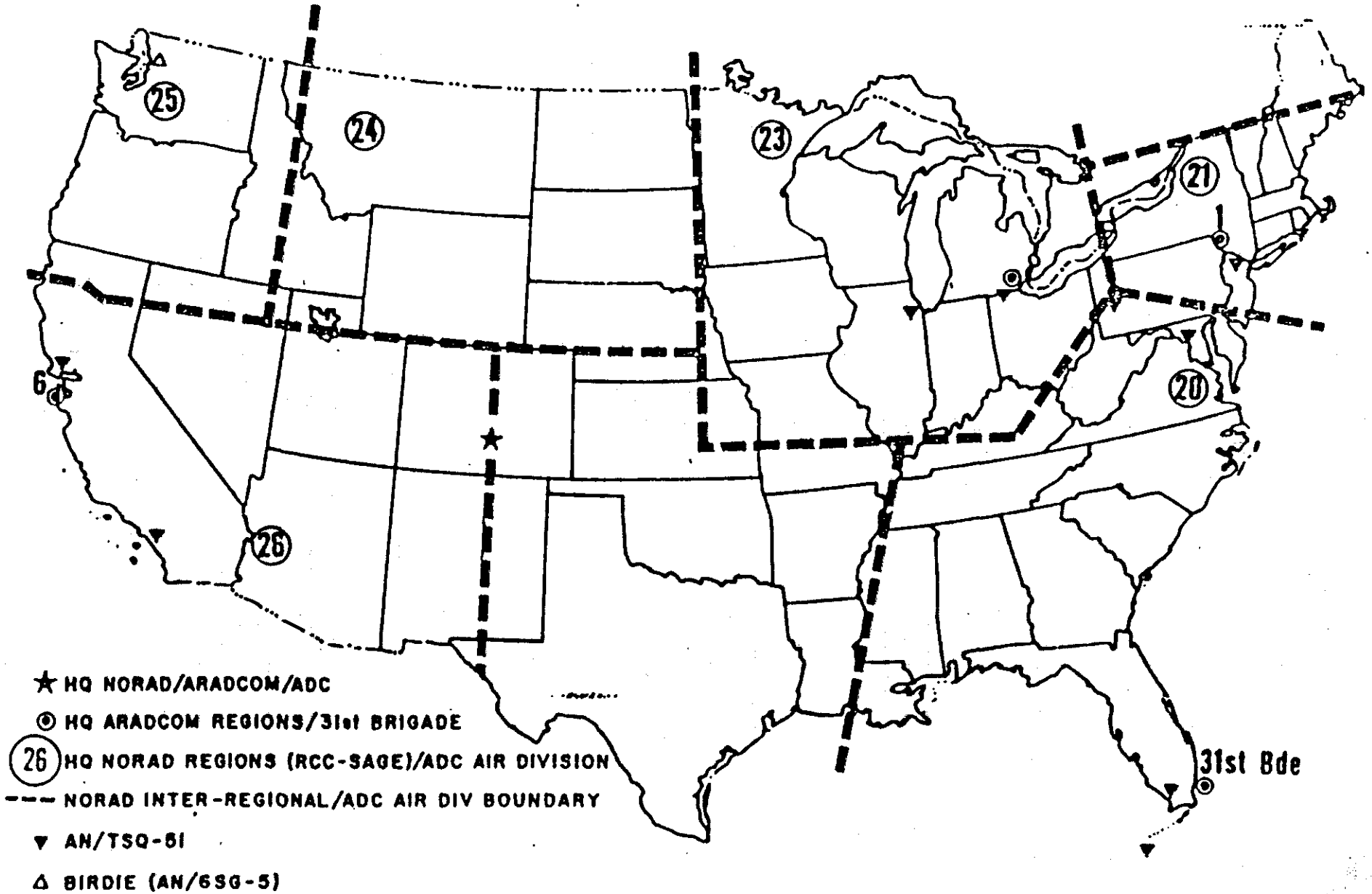

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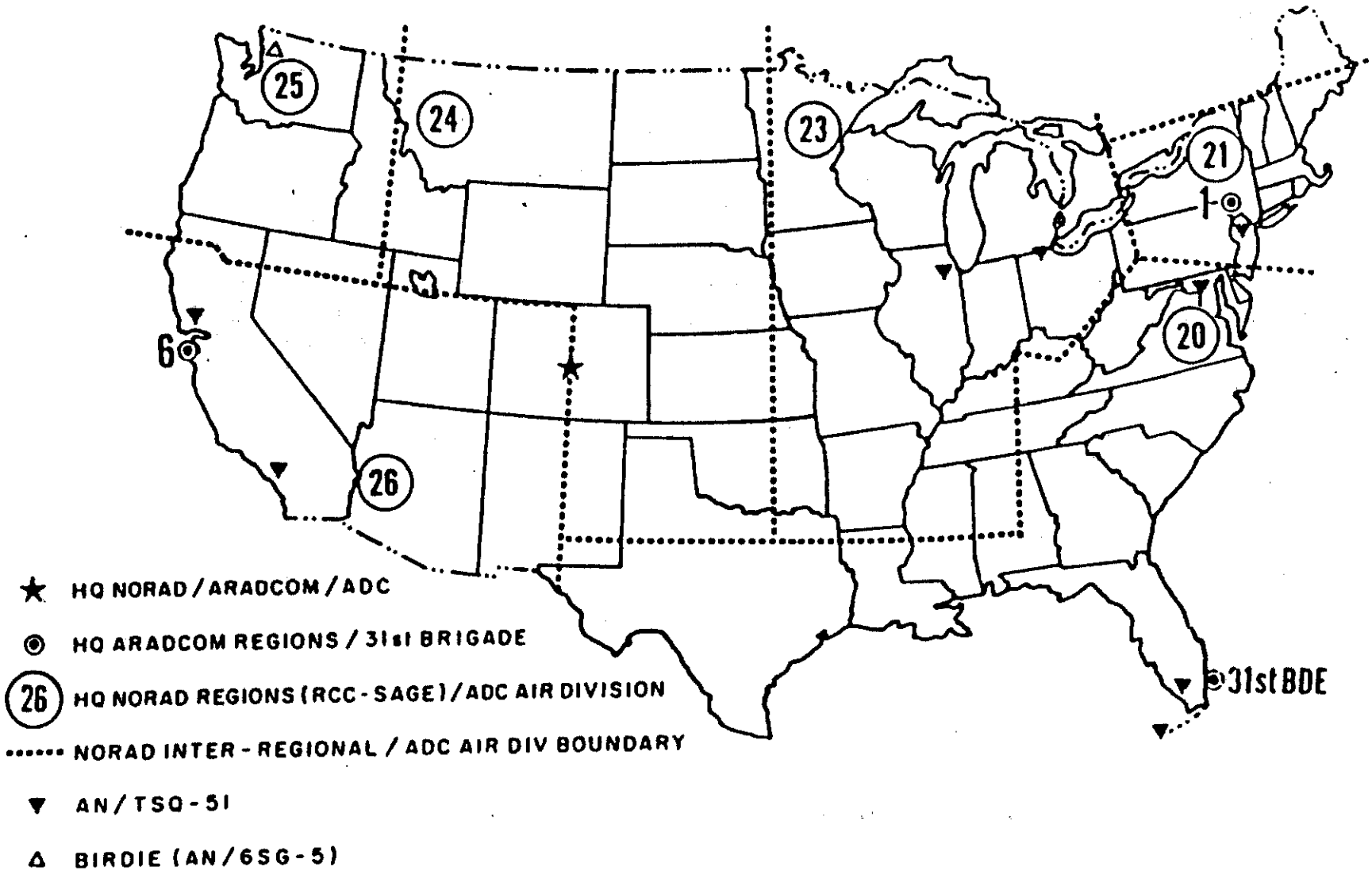
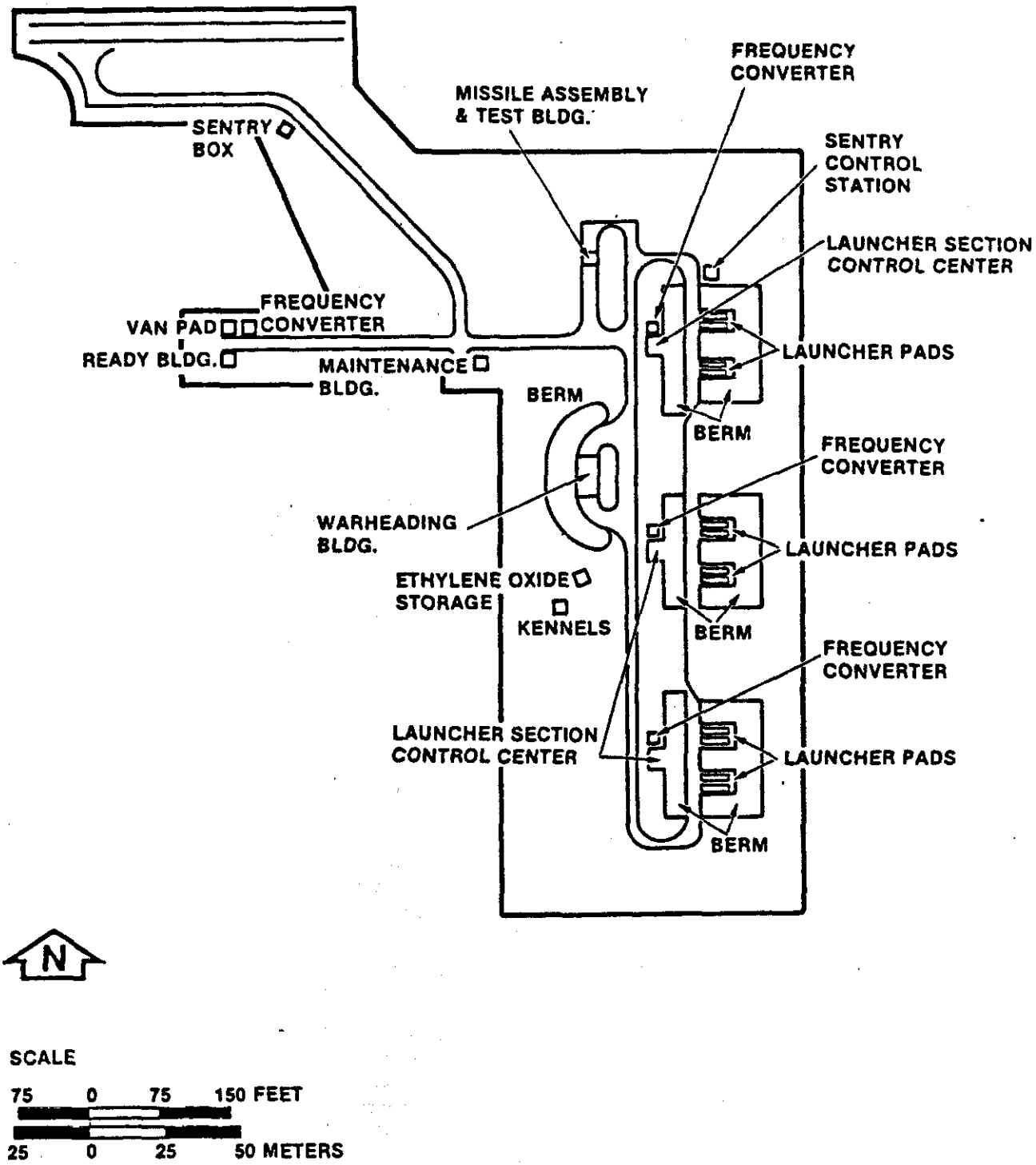


HEADQUARTERS AND AREAS OF RESPONSIBILITY (CONUS)

APPENDIX D

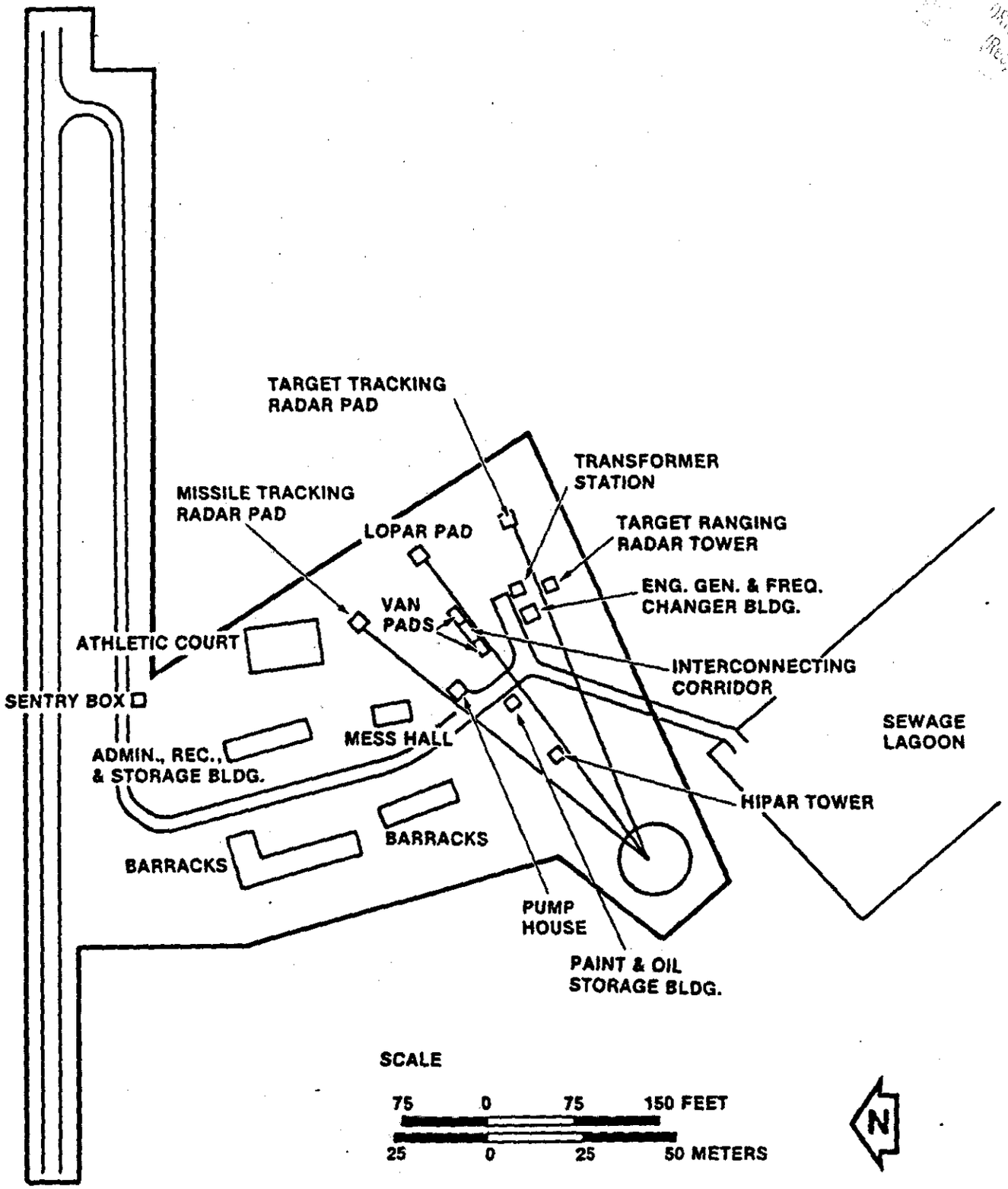
EXAMPLE NIKE SITE MAPS



SOURCE: ESE, 1983.

LAUNCH CONTROL AREA MAP
OFFUT AIR FORCE BASE (OF-10L),
COUNCIL BLUFFS, IOWA

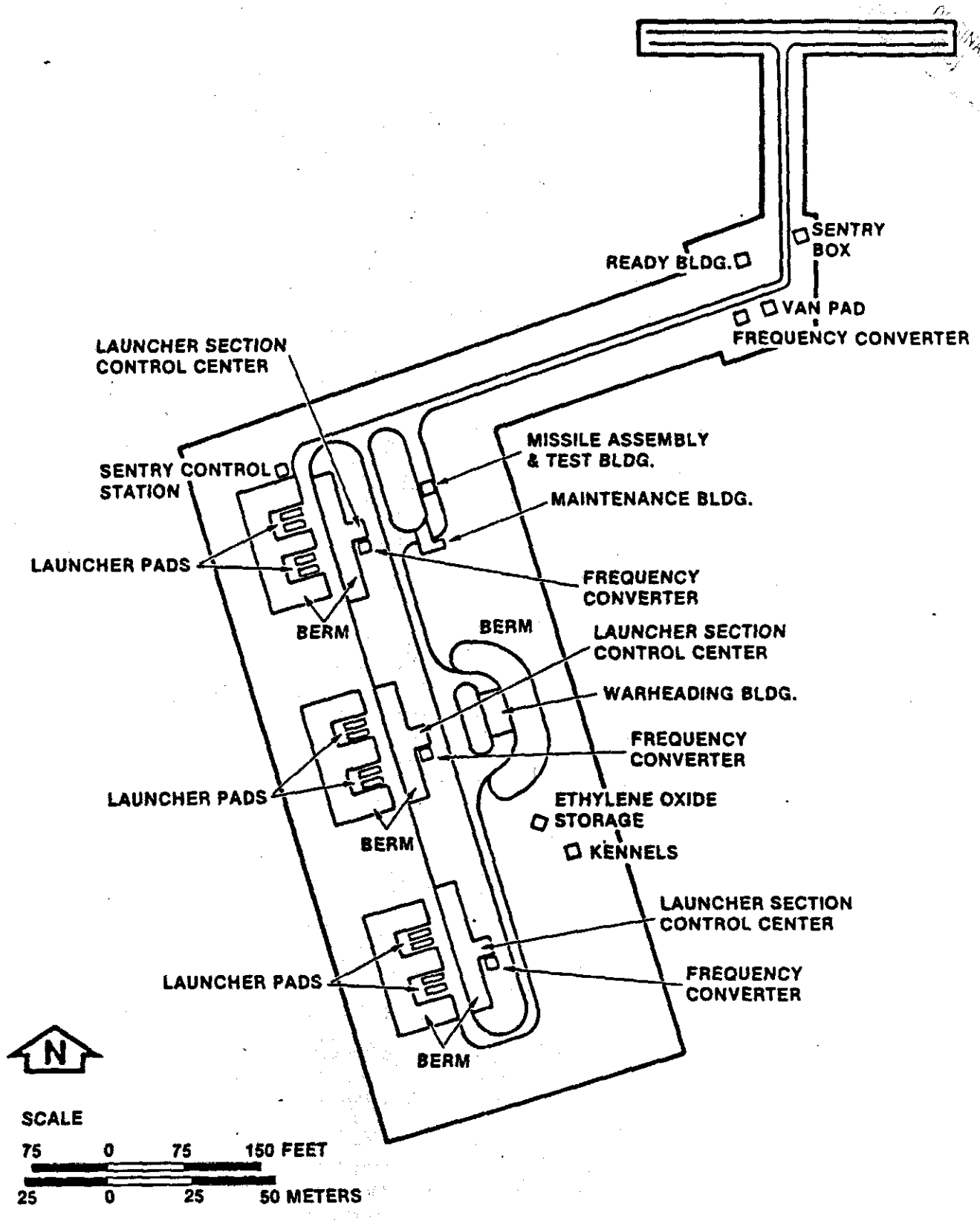
Prepared for:
U.S. Army Toxic and Hazardous Materials Agency
Aberdeen Proving Ground, Maryland



SOURCE: ESE, 1983.

BATTERY CONTROL AREA MAP
OFFUT AIR FORCE BASE (OF-10C),
COUNCIL BLUFFS, IOWA

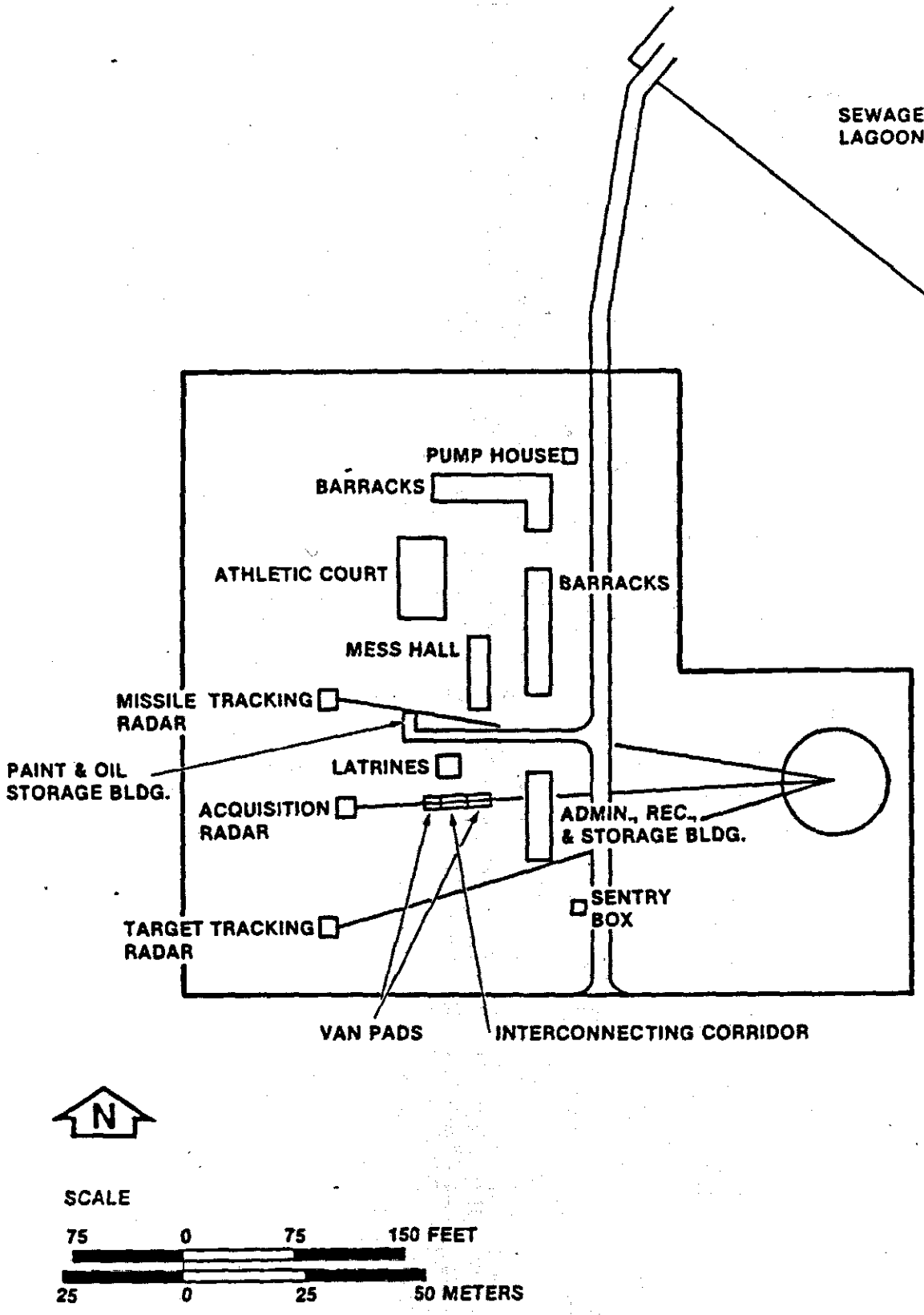
Prepared for:
U.S. Army Toxic and Hazardous Materials Agency
Aberdeen Proving Ground, Maryland



SOURCE: ESE, 1983.

LAUNCH CONTROL AREA MAP
OFFUT AIR FORCE BASE (OF-60L),
PLATTSMOUTH, NEBRASKA

Prepared for:
U.S. Army Toxic and Hazardous Materials Agency
Aberdeen Proving Ground, Maryland



SOURCE: ESE, 1983.

BATTERY CONTROL AREA MAP
OFFUT AIR FORCE BASE (OF-60C),
PLATTSMOUTH, NEBRASKA

Prepared for:
U.S. Army Toxic and Hazardous Materials Agency
Aberdeen Proving Ground, Maryland

ORIGINAL
(Red)

5

ORIGINAL

FINAL REPORT

INVESTIGATION OF FORMER NIKE MISSILE SITES FOR POTENTIAL TOXIC AND HAZARDOUS WASTE CONTAMINATION

VOLUME I

Prepared for:
DEPARTMENT OF THE ARMY
HUNTSVILLE DIVISION, CORPS OF ENGINEERS
HUNTSVILLE, ALABAMA
CONTRACT #DACA87-85-C-0104

Prepared by:
LAW ENGINEERING TESTING COMPANY
LES-GOVERNMENT SERVICES DIVISION
ATLANTA, GEORGIA
LEGS JOB NO. 601

March, 1986

ORIGINAL (Red)

TABLE OF CONTENTS

VOLUME I

SECTION		Page #
1.0	EXECUTIVE SUMMARY	1
2.0	INTRODUCTION	4
3.0	NIKE PROGRAM BACKGROUND	9
4.0	NIKE PROGRAM MILITARY ORGANIZATION	12
4.1	NATIONAL AIR DEFENSE ORGANIZATION	12
4.2	NIKE SYSTEM ORGANIZATION	13
5.0	NIKE BATTERY DESCRIPTION	16
5.1	BATTERY LAYOUT	16
5.2	GENERAL UNIT OPERATIONS	17
5.2.1	Launcher Area	17
5.2.2	Integrated Fire Control (IFC) Area	18
6.0	POTENTIAL CONTAMINATION SOURCE AREAS	19
6.1	GENERAL - WASTE FLUID DISPOSAL	19
6.2	LAUNCHER AREA	20
6.2.1	Missile Assembly Drainage and Seepage Systems	20
6.2.2	Diesel and Fuel Oil Storage Tanks	21
6.2.3	Magazine Sump Seepage Systems	21
6.2.4	Secluded Areas Adapted to "Unofficial" Dumping	22
6.2.5	Warheading/Fueling Area Drainage System	23
6.2.6	Motor Pool	23
6.2.7	Septic Systems	23

TABLE OF CONTENTS

VOLUME I (Cont'd)

6.3	INTEGRATED FIRE CONTROL (IFC) AREA	24
6.3.1	Motor Pool	24
6.3.2	Septic Systems	24
6.3.3	Diesel, Fuel Oil, and Gasoline Storage Tanks	25
7.0	POTENTIAL OPERATIONS PRODUCING CONTAMINATION	27
7.1	LAUNCHER AREA	28
7.1.1	Missile Assembly and Disassembly	28
7.1.2	Missile Fueling and Warheading	29
7.1.3	Missile Maintenance and Testing	30
7.1.4	General Launcher and Magazine Maintenance	33
7.2	INTEGRATED FIRE CONTROL (IFC) AREA	35
7.2.1	Operations Maintenance	35
7.2.2	Vehicle Maintenance	35
7.3	GENERAL OPERATIONS	36
7.3.1	General Facilities Maintenance	36
7.3.2	Utility Service	37
7.3.3	Deactivation	38
8.0	MASTER CONTAMINANT LIST	41
8.1	GENERAL	41
8.2	MASTER LIST CONTAMINANTS	41
8.3	OTHER MATERIALS CONSIDERED	44

ORIGINAL (Red)

TABLE OF CONTENTS
VOLUME I (Cont'd)

REFERENCES

APPENDICES

APPENDIX A - NIKE SITE LISTING FORMS
APPENDIX B - SITE DATA CORRESPONDENCE

VOLUME II

APPENDIX C - SAMPLING AND ANALYSIS PLAN

APPENDIX D - WELL INSTALLATION PLAN

APPENDIX E - HEALTH AND SAFETY PLAN

LIST OF FIGURES

FIGURE		SECTION
1	GENERALIZED NIKE SITE LAUNCHER AREA	5.1
2	GENERALIZED NIKE SITE INTEGRATED FIRE CONTROL AREA	5.1

LIST OF TABLES

TABLE		
I	NIKE SITE OPERATIONS AND ASSOCIATED MATERIALS	7.3
II	GENERAL MATERIALS INVENTORY OF NIKE SITES	7.3
III	MASTER LIST OF SIGNIFICANT POTENTIAL SITE CONTAMINANTS	8.3

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LIST OF ACRONYMS AND ABBREVIATIONS

ARAACOM	U.S. Army Anti-Aircraft Command
ARADCOM	U.S. Army Air Defense Command
ASTM	American Society for Testing and Materials
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFA	Continuous Flight Auger
COE	U.S. Army Corps of Engineers
CONAD	Continental Air Defense Command
CONUS	Continental United States
DERP	Defense Environmental Restoration Program
DOD	Department of Defense
EPA (US)	United States Environmental Protection Agency
gal	Gallons
HSA	Hollow Stem Auger
ICBM	Intercontinental Ballistic Missile
IFC	Integrated Fire Control
IRP	Installation Restoration Program
lb	Pounds
ml	Milliliter
MR	Mud Rotary
NATO	North Atlantic Treaty Organization
NORAD	North American Air Defense Command
OSHA	Occupational Safety & Health Administration
OVA	Organic Vapor Analyzer
PDP	Preliminary Determination Phase
PVC	Polyvinyl Chloride
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
SCBA	Self Contained Breathing Apparatus
VOA	Volatile Organic Analysis
USATHAMA	U.S. Army Toxic and Hazardous Materials Agency

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SECTION 1.0 - EXECUTIVE SUMMARY

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As part of the Department of Defense's (DOD) Defense Environmental Restoration Program (DERP), this investigation was authorized to determine the potential for toxic or hazardous contamination applicable to all former NIKE Missile Sites located throughout the Continental United States. Phase I of this study provided for specific literature reviews and related data gathering functions to provide general information about potential NIKE site contamination. This report addresses these issues. A summary of the pertinent information is presented as follows:

1. NIKE Ajax and NIKE Hercules missiles were deployed by the United States Army throughout the Continental United States to protect major metropolitan areas and strategic military installations from aerial attack. The NIKE system was generally in place in the time frame encompassing the early 1950s to the mid 1970s.

2. A NIKE site typically consisted of two separate and distinct operating units. These included the Launcher Area and the Integrated Fire Control (IFC) Area. The Launcher Area was generally located on approximately 40-60 acres of land although each site could vary significantly in size and shape. The IFC Area, generally ranged in size from 10-50 acres. The barracks facilities were either incorporated as part of the Launcher Area or the IFC Area, or a third separate and distinct Facility Area was constructed.

3. Maintenance of the missile batteries in a combat ready status required the storage, handling and disposal of missile components as well as solvents, fuels, hydraulic fluids, paints, and other materials required for support functions. Normal operating practices at NIKE batteries in the conduct of these functions possibly resulted in

contamination of the subsurface soil and/or groundwater regime.

4. Virtually all of the information concerning the potential for contamination at NIKE Sites came from interpretation of Operating Manuals and resulting questions directed to past NIKE site operators and the general discussion with these operators which followed in the interview phase of this investigation.

5. Potential contamination source areas at NIKE Sites included:

LAUNCHER AREA

- Missile Assembly Drainage and Seepage Systems
- Diesel and Fuel Oil Storage Tanks
- Magazine Sump Seepage System
- Secluded Areas Adapted to Unofficial Dumping
- Warheading/Fueling Area Drainage Systems
- Motor Pool (when present)
- Septic Systems (when present)

INTEGRATED FIRE CONTROL (IFC) AREA

- Motor Pool (when present)
- Septics Systems (when present)
- Diesel, Fuel Oil, and Gasoline Storage Tanks
- Secluded Areas Adapted to Unofficial Dumping

Of these two Areas, the Launcher Area had the greater potential for contamination.

6. Operating practices producing a potential for contamination at NIKE Sites included:

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LAUNCHER AREA

- Missile Assembly and Disassembly
- Missile Fueling and Warheading
- Missile Maintenance and Testing
- General Launcher and Magazine Maintenance

INTEGRATED FIRE CONTROL (IFC) AREA

- Fire Control Operations Maintenance
- Vehicle Maintenance

GENERAL OPERATIONS

- General Facilities Maintenance
- Utility Service
- Deactivation

7. The Master Contaminants List which consists of the potential contaminants of former NIKE Sites that should be investigated for the NIKE Preliminary Determination phase (Phase II of this investigation program) includes:

- Benzene
- Carbon Tetrachloride
- Chromium
- Petroleum Hydrocarbons
- Lead
- Perchlorethylene
- Toluene
- 1,1,1-Trichloroethane
- 1,1,2-Trichloroethane
- Trichloroethene

SECTION 2.0 - INTRODUCTION

The Department of the Defense (DOD), conducts a number of industrial processes and manufacturing operations that are similar to private industry. In the late 1970's, DOD became aware of the negative impacts of what were previously considered acceptable disposal practices of waste materials associated with these processes and operations. In response to that knowledge, programs were developed between 1975 and 1978 by each service component to identify and assess potential contamination on active military installations. Authority to address problems of other than active installations was lacking since funds could not be spent on sites not owned by DOD.

The passage of the 1984 Defense Appropriations Act corrected this problem. Specific language in the Act directed DOD to extend its efforts to include sites formerly used by DOD and broaden the definition of "hazard" to include structures and debris which were to be abandoned or had been abandoned upon termination of its military use.

The Act directed that the Secretary of Defense assume overall management of the program to assure consistent approach and adequate resource allocation. A Defense Environmental Restoration Account was established and provided the resources for the Defense Environmental Restoration Program (DERP). The work performed relative to this study falls within the jurisdiction of the DERP program.

The objective of this investigation addresses the potential for toxic or hazardous contamination applicable to all former NIKE Missile Sites located throughout the Continental United States (CONUS). Contamination includes hazardous or toxic substances formed in ground water, surface water and soil with contaminants specified by regulatory criteria. To fulfill this objective, the

work elements described in the following paragraphs were performed in accordance with the provisions of our contract. Discussion of the manner in which each work element was conducted as well as how it is reported in this document is also presented.

1) Obtain an updated list of the CONUS NIKE sites. This list is presented in Appendix A in the form of individual site reports, entitled "NIKE Site Listing Forms", which describe pertinent known information about each site. This data was gathered during the summer of 1985 and is not considered current beyond that date. Most of the information came from site reports on file at the Corps of Engineers, Huntsville Division offices and from data presented by the Corps of Engineers District offices. The initial working list of CONUS NIKE sites came from the report "Historical Overview of the NIKE Missile System" reference 1, Appendix B-1.

2) Identify the primary agencies involved with the command at the time of operations of the site and identify the responsibilities of the primary agencies involved, relative to the operations of various NIKE Missile systems. This information was gathered through interviews with site operators and basically substantiated the information presented in reference 1. Section 4.0 of this report addresses this subject.

3) Conduct an archive search to obtain copies of the active NIKE site operating procedures, technical manuals, training manuals and field manuals, and develop a summary of information relative to activities which may have caused contamination. Contact was made with the NIKE Project Management Office at Redstone Arsenal for specific input regarding the manuals and procedures which would give information relative to activities which may have caused contamination. Specific manuals were recommended and have

been reviewed in the context of this investigation. This information is presented in Report Sections 6.0 and 7.0.

4) **Meet with three different previous NIKE Site operators and obtain information on site operating practices. Any information relative to site contamination shall be recorded.** This task was carried out with the assistance of the NIKE Project Management office at Redstone Arsenal and included a trip to Ft. Bliss, Texas where the interviews were conducted. The information gathered in this interview process has been incorporated into the basic findings and conclusions of this report.

5) **Review the four USATHAMA reports listed and make reference to the contamination or waste associated with the particular sites.** This review was conducted and information has been used compiling the results of this report. A significant amount of background information has been incorporated from reference 1 to permit proper understanding of the history and operation of the NIKE program.

6) **Determine the location of the "As-Built" drawings for all sites and specify their locations in the report.** Each of the Corps of Engineers District offices was contacted regarding the location of the "As-Built" drawings for NIKE sites under their jurisdiction. A few of the districts reported that "As-Built" drawings were on file at the District office that had jurisdiction over a particular site. In most cases however, the "As-Built" drawings cannot be located. Information regarding the location of the "As-Built" drawings is recorded on the NIKE Site Listing Form for each site given in Appendix A.

7) **Obtain and review the deactivation plans for the NIKE Systems and provide information concerning possible contamination.** Each of the Corps of Engineers District

offices as well as the Redstone Arsenal NIKE Project Management Office was contacted regarding the location of deactivation plans. In no case was it possible to locate any site specific deactivation plans. Two generic deactivation procedures documents were located at the Redstone Arsenal NIKE Project Management Office. These were reviewed for practices concerning possible contamination and the finding were incorporated in the general findings of this report. These documents are listed as part of the reference material.

8) **List substances that may act as possible sources of contamination, such as: solvents, starting fluid mixtures (UDMH), fuels, hydraulic fluids, paints, etc. The list should also include the contaminants from each source. Any substances associated with operations, maintenance or deactivation of the NIKE site should be addressed. The substances must have been used in quantities that justifies evaluation as a contamination source.** The findings of the data gathering process as outlined in paragraphs 1-7 led to the conclusion of the listed substances that may act as possible sources of contamination. The findings as determined by this investigative process are discussed in Section 8.0.

9) **Identify any disposal, maintenance or operating practices that may have caused contamination.** The data gathering process described above also provided information that responded to that requested by this contract task. The results are presented in Section 7.0.

10) **Survey the research information and identify potential contamination source areas within the general NIKE sites.** The data gathering process described above yielded the pertinent information. The results are presented in Section 6.0.

11) Based on the data developed from tasks 1-10, develop a Generic Sampling and Analysis Plan conforming to the requirements of Contract Annex A. Further, a Quality Control and Quality Assurance (QA/QC) Plan shall be developed along with the Sampling and Analysis Plan. The Generic Sampling and Analysis Plan and the Quality Control and Quality Assurance Plan as specified are presented in the Appendix C of this Report. As a corollary to the Sampling and Analysis Plan, a Generic Well Installation Plan has also been developed and is presented in Appendix D of this report.

12) Prepare a Safety Plan that meets the requirements of Annex C of the contract. The Generic Safety Plan as required is presented in Appendix E of this Report.

Work items (1) through (12) constitute Phase I of the NIKE missile site study of potential toxic or hazardous contamination, which is the subject of this report. Phase II constitutes a Sampling and Analysis field investigation of 10 Representative NIKE Sites which will be addressed in subsequent Reports.

Subsequent sections of this report give pertinent background data regarding the NIKE missile program identify potential contamination source areas within the general NIKE site, describe disposal, maintenance or operating practices that may have caused contamination, and present a list of substances that may have acted as possible sources of contamination including the contaminants that result from these sources.

SECTION 3.0 - NIKE PROGRAM BACKGROUND

The main source of background material regarding the history of the NIKE program was included in reference 1. Portions of this reference are summarized herein to provide proper background information regarding the NIKE program.

NIKE Ajax and NIKE Hercules missiles were deployed by the United States Army throughout the Continental United States to protect major metropolitan areas and strategic military installations from aerial attack. The NIKE system was generally in place in the time frame encompassing the early 1950s to the mid 1970s. Maintenance of the missile batteries in a combat ready status required the storage, handling and disposal of missile components as well as solvents, fuels, hydraulic fluids, paints, and other materials required for support functions.

Initial development studies began on the system right after the end of World War II, with the objective of forming an air defense system capable of engaging high speed maneuverable targets at greater ranges than the conventional artillery available at that time. The research and development program for the NIKE system became accelerated in the early 1950s with initial guided missiles becoming operational for the first time in 1954 when combat ready missiles (known as NIKE Ajax) were deployed. Conventional anti-aircraft gun units were outnumbered by NIKE Ajax units by December 1956, and the conversion to guided missiles was completed by mid 1958.

During the period of its operational life, the NIKE Ajax system remained essentially unchanged. However, a second generation NIKE system, to be named NIKE Hercules, was under development by the mid 1950s. NIKE Ajax batteries were similar in design and construction with all units having similar operational components. Minimal field changes were made during the

operational life of the NIKE Ajax system. These were limited to minor equipment modifications to improve operational efficiency. Beginning in late 1958, selected NIKE Ajax batteries began conversion to the more advanced NIKE Hercules system. However, it was not until early 1964, that the last NIKE Ajax battery was deactivated and the entire operational system deployed the NIKE Hercules missile. The primary role of the NIKE Hercules system was its ability to attack high speed, high-flying aircraft formations with a single nuclear warhead. Another significant advancement concerned the nature of the rocket fuels. The NIKE Ajax system used liquid fuels which were highly toxic and had to be handled with extreme care. The NIKE Hercules missiles made more use of solid fuel which significantly simplified the fueling and maintenance operations of the missile system. The initial design guidelines for the NIKE Hercules missile provided for maximum use of proven components from the NIKE Ajax program and stipulated that both missiles must be compatible with all sets of ground and launching equipment. Therefore, a minimal amount of modification of the battery units was required to convert from the NIKE Ajax to the NIKE Hercules system.

During its term of service in the field, the NIKE Hercules system underwent numerous design modifications. As originally conceived, the system was known as basic Hercules. However, several improvement programs were subsequently implemented to keep the system up to date. The design modifications primarily provided improved target tracking, guidance, and interception capabilities by modifying or replacing radar and electronic equipment. However, these modifications to the missile system did not produce any significant change in the battery configuration.

Not all Hercules batteries were retro-fitted for the new equipment , because of budget limitations. Guidelines provided for retro-fitting of certain batteries within any particular defense area, based on the number of batteries located in that

defense area. Hence, the field deployment within a single defense area in the early 1960s may have included Ajax, basic Hercules, and improved Hercules batteries.

NIKE Zeus, the third generation missile of the NIKE program, was the first missile developed in the United States that was designed to defend against Intercontinental Ballistic Missiles (ICBM). However, NIKE Zeus was never approved for production or deployment as a tactical system.

In 1962, the Army began transferring operation of certain NIKE batteries to National Guard Units. Shortly thereafter, deactivation of NIKE batteries began. By 1970, the Army had deactivated most CONUS NIKE sites. National Guard Units continued to maintain a few sites until the late 1970s. Some NIKE equipment is still retained in Ft. Bliss for the purpose of training troops from other North Atlantic Treaty Organization (NATO) countries that still incorporate NIKE missiles in their defense programs.

SECTION 4.0 - NIKE PROGRAM MILITARY ORGANIZATION

4.1 NATIONAL AIR DEFENSE ORGANIZATION

Background information for this Section was taken directly from reference 1 and was substantiated during the site operator interviews, with minor modifications. The reference states that the development of a missile-based air defense system (NIKE) was paralleled by changes in command structure in the defense organization, beginning in July 1950. At that time the Army placed all artillery units with continental air defense missions under the newly organized U.S. Army Anti-Aircraft Command (ARAACOM) located at Ent Air Force Base in Colorado Springs, Colorado. The installation of NIKE Ajax batteries beginning in 1953, led to further re-organization of the Continental Air Defense structure and the Army's Anti-Aircraft missions and organization. On September 1, 1954, ARAACOM and corresponding elements in the U.S. Air Force and the U.S. Navy were combined to form the Continental Air Defense Command (CONAD) at Colorado Springs under the direction of the Joint Chiefs of Staff. In 1957, the Army's air defense responsibility within CONAD was defined as point air defense by missiles fired from the ground to aerial targets not more than 100 miles away. Point defense was to include "Geographical areas, cities, and vital installations that could be defended by missile units which received their guidance information from radars near launching site" and also was to include the responsibility of a ground commander for air protection of his forces. To represent this expanded, all missile role more clearly, ARAACOM was re-designated the U.S. Army Air Defense Command (ARADCOM) on March 21, 1957.

Further development on a national scale occurred in September 1957, when the North American Air Defense Command (NORAD) was formed to combine air defense capabilities of Canada and United

States under a one Commander in Chief, who also headed CONAD. Like CONAD, NORAD elements in the United Stated report directly to the Joint Chiefs of Staff. All Army ARADCOM units were placed under the operational control of NORAD. ARADCOM continued in this basic configuration until 1975, at which time the NIKE missile program had essentially been disbanded in CONUS.

4.2 NIKE SYSTEM ORGANIZATION

The basic operational unit of a NIKE site was the Battery. The Battery was commanded by an Army Captain. On a specific site the Battery was sub-divided into six elements. These are listed below, followed by a brief mission statement:

1) Headquarters Section: The headquarters section was responsible for the operational and administrative control of personnel and equipment.

2) Communications Section: The communications section was responsible for installing and maintaining non-commercial communication nets and operating the commercial communication nets within the Battery.

3) Fire Control Platoon: The fire control platoon was responsible for the operation and maintenance of fire control equipment in the Integrated Fire Control (IFC) area.

4) Launching Platoon: The launching platoon had administrative control over one launching platoon headquarters and three launching sections, which are described in the next paragraphs.

5) Launching Platoon Headquarters: The launching platoon headquarters was responsible for the operation and training of three launching sections. It contained personnel who assembled, tested and performed organizational maintenance

on the NIKE missile and maintained the rounds at the launching section.

6) Launching Section: The three launching sections were responsible for the preparation of the missile and booster for firing after they were delivered to the launching section from the assembly and test area. In addition, they performed the routine non-technical tests, checks, adjustments, and organizational maintenance.

The next organizational unit above the Battery was the Battalion. Generally, there were four Batteries in each Battalion. The Battalion was typically commanded by a Lieutenant Colonel. The Battalion generally consisted of a headquarters and headquarters Battery, four Firing Batteries (described above), and a Medical Section. In addition, any motorpool maintenance activities other than the most routine, were performed at the Battalion level.

The Battalion headquarters and headquarters Battery comprised the following 7 elements:

1) Battery Headquarters
2) Battalion Administration Supply Section
3) Operation and Intelligence Section
4) Battalion Motor and Maintenance Section
5) Communications Section
6) Radar Section
7) Assembly and Service Section

The Assembly and Service Section was a team of technical experts who supervised and assisted in the assembly, testing and performance of organizational maintenance on missiles and boosters.

The organizational unit above the Battalion level consisted of either a Group or a Brigade. This level was usually commanded by

either a Colonel or a Brigadier General. A Group had only NIKE Battalions reporting to it, whereas a Brigade could have other military entities reporting to it besides NIKE Battalions. The Group or Brigade level was organized into United States Regions. The Region was usually commanded by a Brigadier General or a Major General. The Region could have a number of different types of military units reporting to it other than NIKE Groups. As the number of United States military units increased or decreased, the number of regions also changed. The maximum number of regions that constituted the division of the United States military organization was six. The Regions reported to ARADCOM at Ent Air Force Base in Colorado. This organizational structure basically functioned during the period of the maximum activity of the NIKE program during the mid 1960s. As was previously stated, ARADCOM was disbanded in 1975.

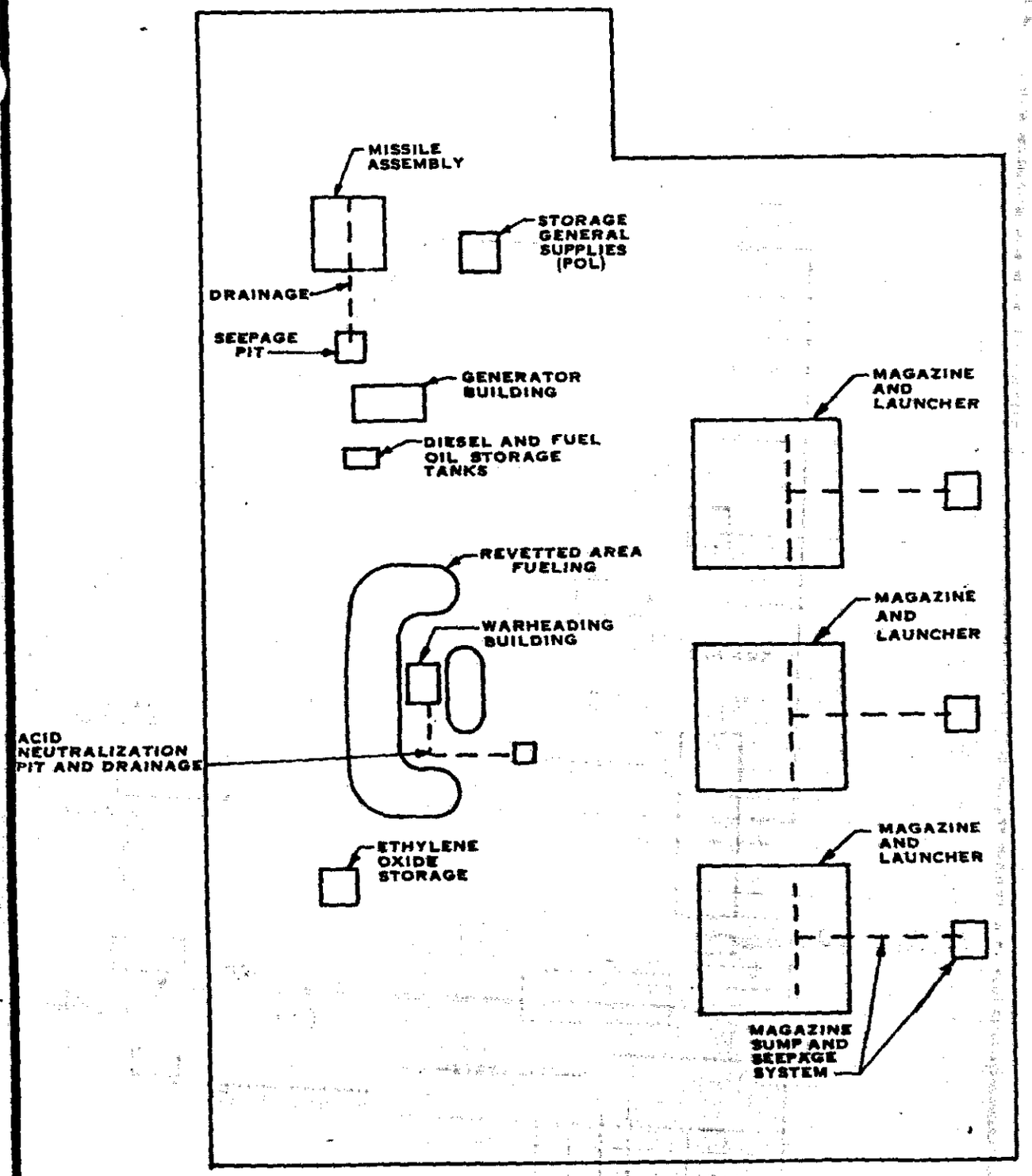
ORIGINAL (Red)

SECTION 5.0 - NIKE BATTERY DESCRIPTION

5.1 BATTERY LAYOUT

A NIKE site typically consisted of two separate and distinct operating units. These included the Launcher Area and the Integrated Fire Control (IFC) Area. The Launcher Area was generally located on approximately 40-60 acres of land although each site could vary significantly in size and shape. The IFC Area, generally ranged in size from 10-50 acres. The Barracks facilities were either incorporated as part of the Launcher Area or the IFC Area, or a third separate and distinct Facility Area was constructed. The Launcher Area and the IFC Area would generally be located 1-2 miles apart to facilitate nedessary distance and equipment restrictions that involved the successful interaction of the two Areas.

The layout of structures within each Area appears to have been site specific, although each site appeared to have certain structures in common. Figures 1 and 2 illustrate a generalized NIKE Launcher Area and a generalized NIKE IFC Area. These Figures illustrate the structural units that appeared to be common to most Batteries although their general location to each other could vary significantly. For the Launcher Area, the key structural units include the missile assembly building, general storage and supply buildings, the generator building, the warhead building, and the three magazine (Missile Storage)/launch units. The IFC Area generally included the radar units, the generator building, general storage and supply buildings, and in most cases, the motorpool. At some sites, the motorpool could have been located at the Launcher Area. In many cases, the IFC Area also had facilities for administration and barracks. Generally, the administration and barracks areas were located at the IFC Area, however, on occasion they were located at the Launcher Area or on a separate parcel of land. These sites also generally



GENERALIZED NIKE SITE

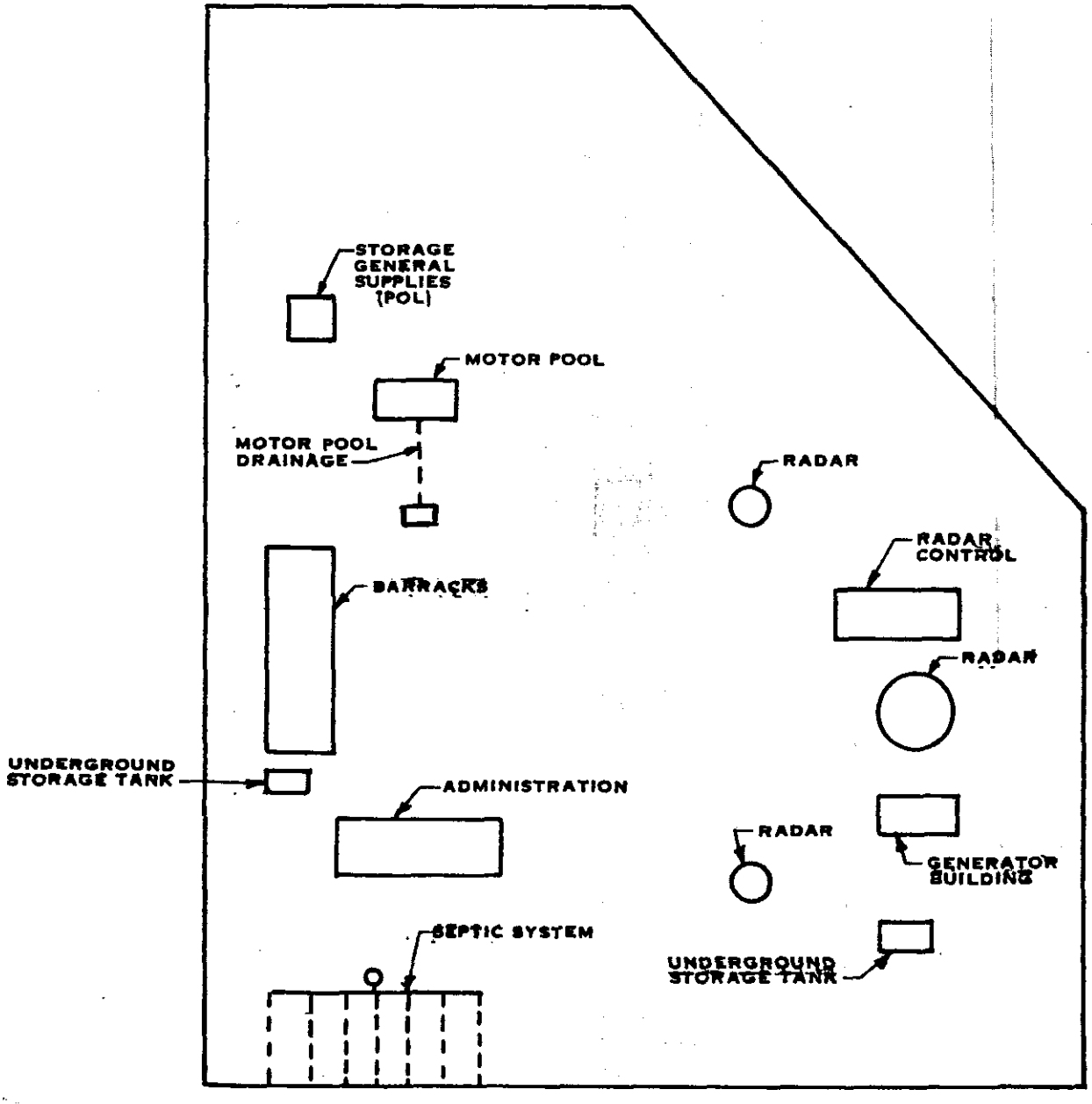
CONTRACT DACA 87-85-0104

LAW ENVIRONMENTAL SERVICES

MARIETTA, GEORGIA

LAUNCHER AREA

FIGURE 1



GENERALIZED NIKE SITE

CONTRACT DACA 57-[illegible]

LAW ENVIRONMENTAL SERVICES

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INTERGRATED FIRE CONTROL AREA

FIGURE 2

included a number of forms of waste disposal including sump and draining systems, seepage pits, septic tanks with infiltration wells for liquid waste disposal, and occasionally on-site landfills.

5.2 GENERAL UNIT OPERATIONS

5.2.1 Launcher Area

The Launcher Area of a NIKE site was the location where the missiles and warheads were assembled, maintained, and prepared for firing. The missiles arrived at the site disassembled into 13 specific components. All operations necessary to make the missiles flight ready were then conducted in specific locations in the Launcher Area. These operations as they applied to contamination are discussed in Sections 6.0 and 7.0. In general, routine maintenance and checking procedures were performed on the missile at the Launcher Area. However, on a periodic basis missiles were returned to the Battalion support shop for more detailed maintenance and service checking. It is estimated that approximately 30 missiles per year were sent from the Battery Launch Area to the Battalion support shop. It was also common practice to randomly select certain missiles to be returned to one of the three national Depot areas for more complete maintenance and service checking operations. The national Depots were located at Letterkenny, Pennsylvania; Tooele, Utah; and Pueblo, Colorado.

Approximately 10 missiles per year were sent from a particular Battalion to Depot. Any shipping of the missile required it to be totally disassembled into its 13 component parts, packed in its original crates, and shipped. This was done at the Battery missile assembly building. It was also routine practice for the personnel of a particular Battery to be sent to McGregor Range in southern New Mexico for test firing practice, about once a year.

When this occurred, the radar units were disassembled at the Battery location for major maintenance and service checking.

5.2.2 Integrated Fire Control (IFC) Area

The IFC Area at a site contained all the radar, guidance, electronic, and communications equipment needed to identify incoming targets, launch missiles, and direct missiles in flight. These operations as they applied to contamination are discussed in Sections 6.0 and 7.0.

SECTION 6.0 - POTENTIAL CONTAMINATION SOURCE AREAS

Because of the nature of site operations, several individual source areas exist for potential contamination on former NIKE sites. Some source areas will be fairly consistent in the type and degree of contamination they present, whereas other sources will reflect site-specific variation.

Generalized site diagrams are presented in Figures 1 and 2. The intent of these Figures is primarily to indicate the major structural units for reference to areas that could have resulted in waste. As previously stated, the location of these units on any given site varied with the terrain and the general arrangement of facilities.

6.1 GENERAL - WASTE FLUID DISPOSAL

Probably the most significant general practice that occurred on site that could lead to contamination was the method of dealing with waste fluids. Standard operating practices dictated that waste fluids were to be accumulated in POL (Petroleum, Oils, Lubricants) Barrels which were periodically transported to official dumps. However waste fluids were reported to have been disposed of directly to the soil surface on occasion, rather than be transported to POL Barrels, resulting in localized contamination. The POL Barrel contents were also reported to have been occasionally dumped in a random "Unofficial" manner, creating concentrations of waste material in the soil both on-site or off-site. Locations of such dumps are predictable only by general site characteristics. This practice was discussed at length in the interviews and will be discussed further in this report relative to specific site units.

Specific site units that could have resulted in waste within the general vicinity of that unit are described in the next sections.

6.2 LAUNCHER AREA

Within the Launcher Area, three or four unit locations can be expected to have the highest probability of contamination. They were the following:

- Missile Assembly Drainage and Seepage Systems
- Diesel and Fuel Oil Storage Tanks
- Magazine Sump Seepage System
- Secluded Areas Adapted to Unofficial Dumping

Three additional areas present some possibility of contamination, however, to a less significant extent.

- Warheading/Fueling Area Drainage Systems
- Motorpool (when present)
- Septic Systems (when present)

6.2.1 Missile Assembly Drainage and Seepage Systems

The missile assembly building operations involved the use of various solvents, anticorrosion products, and paints as the missile was assembled and disassembled. The building was equipped with a full-length drainage system. Spilled or waste materials could be washed or dumped into this drainage system.

The drainage in most cases was a gravity-fed system. Waste materials were washed out of the building and into a small seepage system consisting of perforated tile or a seepage pit. The construction of the seepage system was highly variable and reflects features of the local terrain and soils. Porous soils would require a less elaborate system, since they would readily facilitate drainage. Pits were excavated and filled with gravel or other coarse fill. Seepage pits would tend to concentrate contaminants, when they were in use. It is also a possibility

that seepage systems were abandoned and replaced on sites with long operating histories. Therefore, multiple pits could be present in the vicinity of each other.

6.2.2 Diesel and Fuel Oil Storage Tanks

A number of generators were reportedly used on NIKE sites and storage of diesel fuel was considerable. Tanks were also used to store fuel oil for heating purposes. These tanks were probably steel, but this could not be documented. It is probable that several tanks were present at each site, holding up to 5000 gallons each.

Tanks were usually buried underground. They probably leaked hydrocarbons to some degree into the surrounding soil, due to leakage at connections and possible spillage during transfer operations. Upon deactivation of the NIKE site, some quantities of fuel were abandoned on-site. In many cases, the tanks were never drained. It is now known that there is a high probability of tank deterioration and consequent leakage over time. According to industry standards, underground storage tanks have a working life of 10 to 15 years, and today, most of these tanks have probably begun leaking because of corrosion. Under the new U.S. Environmental Protection Agency program, leaking underground storage tanks (LUST) are considered a priority hazardous waste problem. Thus, buried tanks could present an existing problem.

6.2.3 Magazine Sump Seepage Systems

Within the typical NIKE magazine, a floor drainage system permitted waste materials to be washed to a central sump located under the missile elevator shaft. This sump was equipped with a pump to deliver water and waste out of the magazine and into a seepage system. Solvents, paints, and hydraulic fluid were routinely washed to the sump.

As with the assembly building seepage system, this probably entailed drainage tiles and/or seepage pits. The volume of waste material handled by the magazine sump was probably greater than that of the assembly building, and seepage pits were more likely to be in use. The arrangement of the seepage system varied with the terrain and the arrangement of the magazines and launcher sections. It is also possible that on sites with steep terrain, sumps were simply pumped to a ravine or other watercourse.

6.2.4 Secluded Areas Adapted to "Unofficial" Dumping

Dumping of various wastes was reported as common at NIKE sites. The primary factor affecting the incidence of dumping was convenience. Certain authorized disposal routes were available to NIKE sites. However, utilization of these disposal routes varied from site to site. Solid waste could be delivered to municipal landfills, and the Army POL service was responsible for removing waste solvents, oils, and paints. When the landfill was not convenient or the POL was irregular about their pick-up, other methods were used to dispose of the waste. Rural sites were particularly prone to "unofficial" dumping. Dumping reportedly occurred both on-site and off-site. On-site dumps were secluded locations which would evade the attention of inspecting military officers. Lakes, ponds, swamps, and ravines were suited to this purpose. Off-site dumps could have made use of virtually any nearby ravine or water course. It was reported during the site operator interviews that "unofficial" dumping, including off-site locations was virtually a daily practice at some rural Battery locations. There was also use of "unofficial" dumps as well as public landfills at deactivation, as was learned in the site operator interviews.

6.2.5 Warheading/Fueling Area Drainage System

The potential for contamination in this area is considered to be less than that found in other areas. Liquid fuels were rarely spilled in quantities. The IRFNA (nitric acid), UDMH (dimethyl hydrazine), and ethylene oxide were hazardous, volatile materials and were handled very carefully. It was very rare that quantities of these materials escaped accidentally. No persistent contamination would result from the spillage or leakage, due to the extrem reactivity of each.

Battery electrolyte was reportedly discarded in this area as well. Modest amounts of lead may have been introduced as a result of this operation. However, it is likely that other sources of lead, such as paint, were of much greater magnitude. Sulfates and nitrates in the warheading/fueling area would be insignificant in the concentrations at which they would occur.

6.2.6 Motor Pool

NIKE Site motor pools were not extensive. Most motor pool operations were performed at the Battalion level. However, some minor contamination by solvents, fuels, and lubricants could have occurred. Motor pools as a source of contamination are discussed in greater detail under Section 6.3.1.

6.2.7 Septic Systems

When barracks were sited on the launcher area, a septic system of significant size was required. Urban and suburban NIKE sites tied into municipal wastewater systems. However rural sites required a septic tank and leaching system. Barracks were more often sited at the IFC area, along with the battery administration and other facilities. Septic systems as a source of contamination are discussed in greater detail under Section 6.3.2.

6.3 INTEGRATED FIRE CONTROL (IFC) AREA

The IFC Area was less prone to chemical contamination than the Launcher Area. The diversity of chemicals was smaller, and the primary mission of the IFC radar operation, did not require significant chemical use. The main units of concern with regard to contamination at the IFC area were the following:

- Motor Pool
- Septic System
- Diesel, Fuel Oil, and Gasoline Storage Tanks
- Secluded Areas Adapted to Unofficial Dumping (Refer to discussion under Launch Control Area, Section 6.2.4)

6.3.1 Motor Pool

NIKE site motor pools did not involve extensive operations. Significant motor pool operations were performed at the Battalion location. However, some minor contamination by solvents, fuels, and lubricants could have occurred. In some cases, motor pools were equipped with floor drains and a drainage system similar to that of the assembly building in the Launcher Area. Thus, contamination by hydrocarbons and chlorinated hydrocarbon materials possibly occurred in the immediate vicinity of the motor pool.

6.3.2 Septic Systems

On rural sites, on-site waste water systems composed of septic tanks, distribution boxes, and leaching areas were used. The major function of these systems was handling sewage. However, on occasion, they may have been used to dispose of chemical products, and to that extent they present a potential source of contamination. In urban situations where sewage services were

provided by the municipality, this source of contamination would not be present.

The materials most likely to have been disposed of via septic systems are paints and general domestic cleaning products. Of these, paints present the only threat of significant contamination in the form of oils and metallic pigments. Contamination in this instance would be spread over the area of the leaching field and within the septic tank.

Leaching fields vary in size according to the number of people using the facility and the type of soil at the site. Certain soil characteristics require much larger fields than others, depending on their ability to purify sewage product. On NIKE sites that were manned for many years, it is also likely that septic systems were occasionally replaced.

6.3.3 Diesel, Fuel Oil, and Gasoline Storage Tanks

Fuel storage tanks pose the greatest potential for contamination at the IFC areas. Tanks were present for diesel powered generators and trucks, heating oil, and gasoline for vehicles. As with the Launcher Area, large capacity diesel tanks served emergency power generators. Radar operations required considerable electricity and these generators were fairly large. Generators were routinely tested and leakage and spillage of fuel was common.

On most sites, depending on climatic condition, large volumes of fuel oil were consumed for heating purposes. Barracks and administration facilities were medium sized buildings capable of using thousands of gallons of fuel annually. Other facilities were also heated. Separate mess halls and recreational facilities were often present.

Some gasoline was stored at NIKE site motor pools, although not in quantities as extensive as those used for heating and generator operation.

As discussed earlier, underground storage tanks were reported to have leaked during NIKE site operations, however a greater source of possible contamination was material remaining in the tanks after deactivation. In many cases, fuels were not removed at the time of deactivation, and over a period of time, the likelihood of leaks from these tanks grows significantly. In all probability, most underground tanks at NIKE sites have begun to leak due to deterioration of the tanks.

SECTION 7.0 - POTENTIAL OPERATIONS PRODUCING CONTAMINATION

Virtually all chemical use at NIKE sites posed some potential for contamination. However, those chemicals used as missile fuels were controlled more strictly than maintenance and other operating materials because they were known to be toxic. In many cases, the missile fuels and igniters are strong oxidizers or reducers, and even incidental releases of them would not result in persistent contamination because of their reactivity. Other NIKE operations, including missile and launcher hydraulics, and maintenance operations, had considerably greater potential for causing contamination.

The following list of operating practices covers all major chemical uses that could potentially result in site contamination. The list is followed by a discussion of each operation. These discussions include mention of the chemicals and materials involved, as well as consideration of all factors affecting the potential for contamination.

Launcher Area

1) Missile Assembly and Disassembly
2) Missile Fueling and Warheading
3) Missile Maintenance and Testing
4) General Launcher and Magazine Maintenance

IFC Area

5) Fire Control Operations Maintenance
6) Vehicle Maintenance

General Operations

7) General Facilities Maintenance
8) Utility Service
9) Deactivation

7.1 LAUNCHER AREA

7.1.1 Missile Assembly and Disassembly

Missile assembly at NIKE sites was conducted in an assembly building located in the Launcher Area. All missile components were shipped to the sites in metal canisters and wooden fin crates. Minor chemical use occurred during assembly to remove anti-corrosion compounds, and lubricate and seal various parts. In the early phases of the NIKE program, some sanding and grinding of missile parts were conducted to repair defects. However, these operations were abandoned later in the program and defective parts were returned to the battalion or depot for repair, or return to the manufacturer.

Some painting was also conducted in the assembly building. This was done on an as-needed basis, and battalion commanders could choose to have missiles painted with optional camouflage.

Solvents used for missile preparation and cleaning included petroleum distillates (Stoddard Solvent, etc.), chlorinated solvents, and small use of alcohols. Waste solvent could be saved for POL Turn-In or, perhaps more often, was washed into drains that had a surface leaching system connected. Large quantities of certain solvents would evaporate during use. This particularly applies to the chlorinated solvents, such as carbon tetrachloride. The effects of surface leaching systems on contamination, depends greatly on the depth of the system, soil types, and local climate. Arid, sandy environments encourage further evaporation and rapid leaching of unevaporated materials. Finer grained soils (clays or silts) with routine rainfall discourage evaporation and decelerate leaching of some solvents.

Lubricants, sealants and paints are less adapted to disposal by drainage systems, although this was probably practiced for small quantities of left-over or waste material. Cans of waste and

left-over material were dumped as solid waste which was delivered to local landfills. Rural sites may have frequently used unofficial dumps for disposal of these materials.

7.1.2 Missile Fueling and Warheading

Missile fueling and warheading was conducted in a revetted area separate from the assembly building. During the early period of the NIKE program, when conventional warheads were in service, this area was open. With the deployment of nuclear warheads, a Warheading Building was constructed and used for these operations.

In this area, missiles were fueled with the various materials and warheading of the missile was accomplished. The electrical batteries were installed here, as well as certain other delicate structural maintenance. Service and filling of the missile Accessory Power Supply was often conducted in this area as well.

Fueling with unsymmetrical dimethylhydrazine (UDMH), inhibited red fuming nitric acid (IRFNA), aniline, furfuryl alcohol, and ethylene oxide required care and presented fire and personnel safety hazards. Their use was governed by fairly strict protocol. Turn-In to depot for official disposal, as a mens of recycling to maintain fresh fuel on site, was probably strictly practiced. Environmental contamination was probably limited to incidental releases. With the exception of aniline and furfuryl alcohol, these materials were all reactive, and would dissipate rapidly in soil. Resulting compounds in most cases would be of low toxicity (nitrate, carbon dioxide, water, and ammonia). Reaction of UDMH and IRFNA could generate nitrosamine compounds. However, the likelihood of this occurring because of safety precautions, was very remote.

Ethylene oxide was used as a fuel for the Accessory Power Supply (APS) on the missile. It was maintained and used to test the

system periodically. Ethylene oxide was routinely disposed of on-site via burning or dilution with water and subsequent surface dumping. As mentioned, ethylene oxide was used in moderate quantities and is reactive. Thus, there is virtually no possibility of persistent contamination.

As far as other fuels were concerned, the primary propellants were either hydrocarbons such as JP-4, or solid materials. JP-4 was used in the sustainer stage of the Ajax missiles and leakage could present some potential for contamination. All deployed Hercules missiles utilized sealed solid propellants with essentially no potential for release.

The fueling/warheading area had acid neutralization pits and general surface drainage. Spilled material occurring during "top-off" of fuel tanks was washed into the drainage system. Spilled battery electrolyte would also cause some light contamination from lead ions in the solution.

7.1.3 Missile Maintenance and Testing

Missile maintenance was conducted in four locations: the magazine, above ground at the launcher, the fueling area, and the assembly building. Refer to Figure 1 for the general location of these units. Where the maintenance took place depended on the specific operation. Simple procedures not involving the fuels or warhead or related electronics could be handled in the magazine. Other procedures required that the missile be taken above ground or to the fueling area. Major structural repairs required that the missile be defueled and returned to the assembly building.

Maintenance or repair of corrosion or hydraulic problems were most common. Certain missile parts were composed of magnesium or magnesium alloys and were very subject to corrosion. Hydraulic systems needed frequent checks and leakage was not uncommon.

Removal of corrosion from metal parts was conducted with at least three types of cleaners. Phosphoric acid in alcohol solution was used for aluminum parts, and alodine powder was used in water for certain minor cleaning. Most significant was the use of chromates in the form of chromium trioxide and sodium dichromate. Chromium trioxide is a solid material available in 5 pound containers. This was dissolved in water and used to wash magnesium and steel. Sodium dichromate is also a solid, but was dissolved in acids to form a pickling solution. Metal parts were dipped in this solution. These chromates may have been used in quantities large enough to cause contamination. Chromates are heavy metals, highly toxic, and in some cases are carcinogenic. Solutions used for decorrosion were undoubtedly washed into sumps and allowed to leach into the soil. It is also possible that significant dumping of chromium trioxide may have occurred during deactivation. This was discussed in the interviews.

Cleaning solvents were also used in missile maintenance. General cleaning and degreasing used Stoddard-type solvents (petroleum distillate), carbon tetrachloride, trichloroethane(s), perchlorethene, and trichloroethene, with minor use of alcohol and acetone. Chlorinated solvents are preferred degreasers and were heavily used. Solvents supplied by the depot were sometimes substituted and available excess quantities of certain solvents may have encouraged their use. Inventories of old solvents continued to be delivered to NIKE sites after the solvent was eliminated from military procurement. Perchlorethene was used on NIKE sites, but was previously unreported. This was disclosed in the interviews.

Painting of missile components also involved the use of chromium and another priority pollutant, lead. Zinc chromate paint was used to prime magnesium parts subsequent to cleaning. Lead-based paint was used for steel. Much of the paint was consumed. However, wastes resulted from the removal of old paint and unused

paint remaining in cans. Paint is not well suited to drainage disposal, however, it is likely that some was eliminated in this manner. More often, leftover paint was disposed of via POL collection or "solid" waste dumping. Dumping may have been practiced on-site or off-site in unofficial dumps, or else community landfills may have been used.

Heavy metal contamination from paints may be a problem on NIKE sites. However, mobility in ground water is limited by the paint vehicle and the solubility of the metal ion. While hexavalent chrome from chromium trioxide is soluble, lead and chrome in paints is much less soluble. This somewhat decreases the probability of finding these metals in ground water samples even when they are present in soils.

Missile hydraulic fluid was replaced on a regular basis, and leakage, particularly of Ajax systems, was common. Used fluid that was drained from the missile may have been wasted to the sump, returned to POL, or dumped. Leakage was usually washed to the drainage sump. Unused hydraulic fluid also was disposed of, because once a can of fluid was opened, it was used immediately or disposed.

Aircraft turbine fluid was used for lubricating gears in the Missile Accessory Power Supply system. This fluid was probably synthetic tricresyl phosphate, which is a moderately toxic material. This was used in comparatively small quantities, however, some fluid probably did contaminate NIKE sites.

Hydraulic fluids and paints are composed primarily of petroleum oils. In instances where these were disposed of on-site, persistent contamination would occur.

The Accessory Power Supply and Hydraulic Pumping Unit provided critical power for control functions during the flight of a missile. Both systems were tested frequently, along with the

electrical systems. Testing of the Accessory Power Supply sometimes utilized a "hot run" in which the ethylene oxide fuel was actually burned. Hot runs required that the missile be out of the magazine. Ethylene oxide was refueled after the run. As mentioned earlier, ethylene oxide waste was disposed of via burning or put into surface water. It is reactive, and would not have persisted on NIKE sites.

Periodic wipe testing of nuclear-armed missiles and the warheads were conducted for radiation leakage. Protocol required that rags utilized for these tests be disposed in lead-lined barrels and delivered for disposal as radioactive waste. This protocol was frequently not followed, however, and rags were often disposed as regular solid waste. No accounts of radiation leakage were identified, and since leakage of this type was taken very seriously and warheads strictly constructed, it is unlikely that rags were ever contaminated by any measurable amounts of radiation. Interviews confirmed this information.

7.1.4 General Launcher and Magazine Maintenance

Maintenance of the structural, mechanical, and hydraulic systems of the launcher and magazine were significant chemical-using operations. Similar to the maintenance functions required for the missile, the launcher and magazine required cleaning, painting, and hydraulic work. Launchers routinely leaked hydraulic fluid. The elevator used to move missiles up from underground magazines had an extensive hydraulic system.

NIKE sites varied somewhat in their magazine and launcher configuration. Underground magazines were standard, but were impractical in areas with high water tables (Florida) or permafrost (Alaska). Arrangement of the various facilities was dependent on the orientation of local terrain.

The magazine stored missiles and contained storage racks and a rail system used to deliver the missiles to the elevator. Once above ground, the missile was moved on rails to the launchers. Rail handling of missiles required that all portions of the rails, racks, and dolly wheels be clean and free of corrosion. The rail system was cleaned with metal brushes and solvent. Naphtha type solvents were routinely used to wipe down the rails, leaving a light, oily residue coating the surface. Painting of the rail structures probably utilized a lead oxide primer followed by a coat of "GI green", in accordance with Operating Manual procedures.

As with the launchers the missiles also routinely leaked hydraulic fluid and required routine maintenance. Leaking fluid was washed into surrounding soil. Used fluid that was drained from the launchers probably was collected for dumping or disposal by Army POL personnel. In some instances, disposal to a sump and subsequent subsurface leaching may have been practiced.

In the magazine, waste materials -- solvents, paints, and hydraulic fluid -- were often washed to the magazine sump located at the bottom of the elevator shaft. Leakage of fluid from elevator hydraulics could produce a considerable volume for disposal to the sump. Hydraulic system "blow-outs" occurring during operation of any hydraulic equipment would cause instant release of fluid.

Hydraulic fluid is a hydrocarbon oil of moderate viscosity. The constituents of hydraulic fluid, as with other petroleum products, are varied and numerous.

7.2 INTEGRATED FIRE CONTROL (IFC) AREA

7.2.1 Operations Maintenance

The primary mission of the IFC area was radar tracking and missile guidance. Radar, consisting of three systems, did not require extensive chemical use. Maintenance of radar was mostly electrical, utilizing small amounts of solvent for cleaning. The HIPAR System (High-Power Acquisition Radar) used a coolant pumping system consisting of an ethylene glycol circulating system and pump. The ethylene glycol was replaced annually. The pump was oil lubricated.

Paint composed the most significant chemical use on the radar systems. Disposal of paint at the IFC area was limited by the availability of disposal facilities. Waste paints were more likely to be collected and removed for off-site disposal or occasional "unofficial" dumping.

Fire control electronics also used certain electronic tubes that contain low-level radiation sources in minute amounts. These tubes were often disposed of indiscriminately in earlier portions of NIKE site operations. Tubes may have been disposed with solid waste or even "tossed" on the ground. In the latter portions of the NIKE program, these tubes were more strictly controlled. Despite possible on-site disposal, the volume and hazard of this material is minimal. A probable maximum of six of these tubes per year were discarded in this manner, according to the site interviews.

7.2.2 Vehicle Maintenance

Limited motor pool operations occurred on NIKE sites. An individual NIKE Battery did not have responsibility for vehicle maintenance. Vehicles were delivered to the battalion for all

maintenance and service. Occasional minor service or emergency service may have consumed small volumes of solvents, paints, and lubricants, so that minor contamination in the area of the motor pool is possible. Some limited contamination from gasoline is also possible. It is noted that at some locations, the Battery motor pool was located in the Launcher Area.

7.3 GENERAL OPERATIONS

7.3.1 General Facilities Maintenance

Painting and cleaning were the only consistent chemical using operations for maintenance of other NIKE facilities. Buildings and structures were maintained and certain punitive functions for military personnel consumed paints and cleaning materials. The common building paints of the NIKE period used lead as a pigment (20-30 percent). On-site disposal of paint was variable. In some cases, ground leaching systems, such as the drainage at the assembly building, are likely to have been used. "Unofficial" dumping of paint was also likely. Septic systems may also have been used for disposal to a limited extent.

Water-soluble cleaning products are likely to have been discarded via surface disposal on-site, "flushing" to septic systems, or ground leaching systems. These products are unlikely to pose contamination problems, however, because of the limited quantities used.

Pesticides had some use at NIKE sites, however, their use was quite variable and probably did not pose a serious contamination hazard. Herbicides were used at some NIKE sites to maintain vegetation-free areas around site perimeters and launch areas. The function of this use was primarily fire control.

7.3.2 Utility Service

NIKE sites were supported by certain on-site utilities which pose significant potential for contamination. A number of generators were used to support emergency operation of the site, including radar on the IFC Area and missile readiness on the Launcher Area. Generators were carefully maintained and routinely tested. Diesel fuel was stored in large quantities for generator operation. Fuel was likely to have spilled during transfer and pumping operations. Tank were typically located below ground, and remained on-site after deactivation. Tanks probably leaked fuel while the site was operated, and fuel left in the tank after deactivation is likely to have leaked as the tanks deteriorated.

Tanks were also used to store fuel oil for heating purposes. Similar problems existed with these tanks, and quantities of fuel oil also are likely to have contaminated NIKE sites. These tanks could have been located either on the ground surface or below ground. Quantities of fuel oil and diesel fuel in use on NIKE sites consisted of an annual use of several thousand gallons. The extent of possible contamination from these tanks could vary considerably from site to site. The diesel and fuel oil storage tanks were sited at several locations on both the IFC Area and the Launcher Area.

Waste oils and hydraulic fluid were routinely used to control vegetation along underground cable-runs. Cable was usually run through shallow, concrete-walled troughs. Large cables connected the Launcher Area and the IEC Area . Oil was poured in or on the troughs to eliminate vegetation. This produced widespread, but low-level contamination in both the Launcher Area and the IFC Area.

Polychlorinated Biphenyls (PCBs) were also in use at NIKE sites in transformers. Release of PCBs would have been very infrequent since these are sealed units. Occasional rupture of transformers

is possible and would have resulted in contamination with comparatively small volumes of material. When deactivation occurred, transformers remained on-site and eventual deterioration may also have resulted in some contamination. PCBs are relatively immobile in soil and contamination would have been limited to the area in the immediate vicinity of a leaking transformer. The quantities and infrequent release of PCBs make it unlikely that serious and consistent contamination will be found on NIKE sites.

Asbestos was in widespread use at NIKE sites for insulation purposes. It is unlikely that any quantity of asbestos was disposed on-site, since the material remained in place during operation and would require disposal as a solid waste. Although there is probably little asbestos present as a ground contaminant, it is likely to remain on-site in its original form in buildings, on piping and ductwork, until removed during demolition.

7.3.3 Deactivation

As previously stated in Section 2.0, paragraph (7), no site specific deactivation plans were obtained. The primary information concerning deactivation practices came from the site operator interviews. Two generic plans (references 8 and 9) were reviewed; however they did not address issues pertaining to chemicals or practices that may have involved contamination.

As stated, deactivation protocol according to stated procedures does not suggest any source of contamination, however, actual practice of deactivation probably resulted in disposal and/or abandonment of considerable volumes of potentially hazardous materials according to the site interviews. Specific practices varied significantly from site to site. Used chemical materials were normally returned to the depot at the time of deactivation for credit on the battalion budget. However, during

deactivation, it often proved expeditious to simply abandon some materials, and partially-used or waste material was probably removed by the most efficient means. Dumping in municipal or "unofficial" dumps was reported to be widely practiced, as revealed in the interviews.

As an example of deactivation procedures at a particular site, an instance of dumping chromium trioxide (chrome VI) in excess of 100 pounds during deactivation was reported in the interviews. Waste oils, paints and solvents were discarded via sumps and other drainage. Barrel volumes of waste were delivered to landfills and dumps. On-site landfilling of waste probably occurred to some extent. Any dumping of UDMH canisters would have occurred at this time. Pesticide dumping in barrel quantities was also reported in the interviews. This could present a potentially serious, although very infrequent, contamination at the dump site. The serious possibility of contamination resulting from deactivation is difficult to address, however, because of the high variability of the disposal locations and the quantities of materials discarded. Any low-lying areas on-site which would be secluded from the primary operating area were likely candidates for some "unofficial" dumping both during site operation and at deactivation.

NIKE site operations and the resulting potential associated material contamination as discussed herein are summarized in two Tables as follows:

Table I (NIKE Site Operations and Associated Materials) presents the materials used under each NIKE site operations category together with the usual disposal method and results of such disposal.

Table II (General Materials Inventory of NIKE Sites) presents an alphabetical listing of the materials used, together with a quantity estimate of annual use, the purpose for which it was

used, and the results of disposal. Table II was used to determine the Master Contaminant List for the purposes of NIKE Field Investigation Studies which is discussed in Section 8.0.

TABLE I

NIKE SITE OPERATIONS AND ASSOCIATED MATERIALS

OPERATIONS	MATERIALS	DISPOSAL METHOD	RESULTS OF DISPOSAL
1. Missile Assembly and Disassembly			
- Cleaning and Preparation	Solvents	Evaporation Drainage and Leaching	None Persistent in Soils
	Anticorrosion Compound	Solid Waste Disposal Drainage and Leaching	Minimal-Small Quantities Minimal-Small Quantities
- Lubrication, Sealing and Painting	Lubricants, Sealants, and Paints	Solid Waste Disposal POL Turn-In Drainage and Leaching	Dependant on Dumping Practices None Persistent in Soils
2. Missile Fueling and Warheading	UDMH	Depot Turn-In Burial (rare)	None None-Rapid Reactive Decay
	IRFNA	Depot Turn-In Spills (rare)	None None-Rapid Reactive Decay
	Aniline-Furfuryl Alcohol	Depot Turn-In Spills (rare)	None Minimal-Small Quantities
	JP-4	Depot Turn-In Spills	None Small-Persistent in Small Quantities
- Electrical Batteries	Sulfuric Acid (Electrolyte)	Draining and Leaching	None-Small Quantities, Reactive Deacay
	Lead	Draining and Leaching	Small-Limited Quantities

TABLE I

NIKE SITE OPERATIONS AND ASSOCIATED MATERIALS

OPERATIONS	MATERIALS	DISPOSAL METHOD	RESULTS OF DISPOSAL
8. Utility Service			
- Generator Operation	Diesel Fuel	Consumed Leakage	None Persistent in Soils
- Heating	Heating Oil	Consumed Leakage	None Persistent in Soils
- Vegetation Control in Cable Runs	Hydraulic Fluid and Oils	Surface Dumping	Small-Limited Quantities
- Electricity Service	Polychlorinated Biphenyls	Leakage	Small, Highly Variable
- Insulation (Fire Proofing)	Asbestos	None-Remains in structures	None (Minimal)
9. Deactivation	All Materials o Solvents o Lubricants o Fuels o Etc.	Dumping	Highly Variable-Persistent When Present

TABLE II

GENERAL MATERIALS INVENTORY OF NIKE SITES

MATERIAL	ANNUAL USE	USE CHARACTERISTICS	DISPOSAL METHOD
Acetone	20 gal.	Special Cleaning	Evaporation, Drainage and Leaching
Adhesives	50 lb.	Sealing Missile Components	Consumed, Solid Waste Disposal
Alodine Powder	10 lb.	Decorroding Metal Parts	Drainage and Leaching
Aniline	10 gal.	Ajax Fuel/Starter	Depot Turn-In, Spillage to Soil
Asbestos	500 lb.total	Insulation/Fire Proofing	Minor Release, Intact on Site
Benzene	100 gal.	Solvent	Evaporation, Drainage and Leaching
		General Solvent and Fuel Constituent	Fuel Tank Leakage
n-Butanol	20 gal.	Missile Cleaning	Drainage and Leaching
Carbon Tetrachloride	300 gal.	Solvent	Evaporation, Drainage and Leaching
Corrosion Preventatives (Pastes)	20 lb.	Metal Sealing of Missile	Consumed, Solid Waste Disposal
Chromium Trioxide	100 lb.	Decorroding Missile Parts	Drainage and Leaching, Surface Disposal

TABLE II

GENERAL MATERIALS INVENTORY OF NIKE SITES

MATERIAL	ANNUAL USE	USE CHARACTERISTICS	DISPOSAL METHOD
Diesel Fuel (Hydrocarbons)	10,000 gal.	Fuel for Generators	Consumed, Spillage to Soil, Fuel Tank Leakage
unsym.-Dimethyl Hydrazine	10 gal.	Missile Fuel/Starter	Depot Turn-In, Landfill
Dry Cleaning Solvent (Hydrocarbons)	500 gal.	Solvent	Evaporation, Drainage and Leaching
Electrical Insulating Oil	20 gal.	Electronics Lubricant	POL Turn-In, Leakage
Ethanol	20 gal.	Solvent	Drainage and Leaching
Ethylene Glycol	25 gal.	HIPAR Coolant	Unknown
Ethylene Oxide (Liquid Form)	200 gal.	APS Fuel	Burning, Surface Disposal
Freons (Chlorofuorocarbons)	Unknown	Solvent	Evaporation, Drainage and Leaching
Furfuryl Alcohol	10 gal.	Ajax Fuel/Starter	Depot Turn-In, Spillage to Soil
Gasoline (Hydrocarbons)	1,000 gal.	Vehicle Fuel	Consumed, Fuel Tank Leakage

TABLE II

GENERAL MATERIALS INVENTORY OF NIKE SITES

MATERIAL	ANNUAL USE	USE CHARACTERISTICS	DISPOSAL METHOD
Greases (Hydrocarbons)	100 lb.	Machinery Lubricant	Consumed, Drainage and Leaching, POL Turn-In
Heating Oil (Hydrocarbons)	20,000 gal.	Fuel	Consumed, Fuel Tank Leakage
Herbicides	20 lb.	Vegetation Control	Consumed
Hydraulic Fluid (Hydrocarbons)	2,000 gal.	Hydraulic Fluid	Drainage and Leaching, POL Turn-In, Surface Disposal
Isopropanol	20 gal.	Deicing of Equipment	Evaporation, Surface Disposal
JP-4 (Hydrocarbons)	500 gal.	Missile Fuel	Depot Turn-In, Drainage and Leaching
Lead (Carbonates and Oxide)	200 lb.	Paints and Battery Electrolyte	Drainage and leaching, POL Turn-In
Low-Level Radiation Sources	<1 lb.	Electrical Tubes	Solid Waste Disposal, Depot Turn-In
Lubricating Oils (Hydrocarbons)	200 gal.	Lubrication of Machinery	POL Turn-In, Drainage and Leaching Surface Disposal
Mineral Spirits (Hydrocarbons)	500 gal.	Solvent/Thinner	Drainage and Leaching

TABLE II

GENERAL MATERIALS INVENTORY OF NIKE SITES

MATERIAL	ANNUAL USE	USE CHARACTERISTICS	DISPOSAL METHOD
Molybdenum Disulfide	5 lb.	Lubricant	Consumed, Drainage and Leaching
Naphtha (Hydrocarbons)	50 gal.	Solvent/Thinner	Drainage and Leaching, Evaporation
Nitric Acid (IRFNA)	300 gal.	Missile Fuel/Starter	Depot Turn-In, Spillage to Soil
Paints (Hydrocarbons & Pigments)	300 gal.	Paint	Consumed, POL Turn-In, Drainage and Leaching, Surface Disposal, Solid Waste Disposal
Perchlorethylene (Tetrachloroethene)	100 gal.	Solvent	Evaporation, Drainage and Leaching
Phosphoric Acid	20 gal.	Cleaning Metal	Drainage and Leaching, Surface Disposal
Polychlorinated Biphenyls (PCBs)	100 gal.total	Electric Insulator	Removed, Intack on Site, Leakage to Soils
Propanol	10 gal.	Missile Cleaning	Drainage and Leaching
Selenium (Metallic)	100 lb. total	Rectifier Parts	Removal, Intact On Site, Solid Waste Disposal

TABLE II

GENERAL MATERIALS INVENTORY OF NIKE SITES

MATERIAL	ANNUAL USE	USE CHARACTERISTICS	DISPOSAL METHOD
Sodium Dichromate	50 lb.	Metal Cleaning	Drainage and Leaching
Sodium Phosphate (Tribasic)	50 lb.	Equipment Cleaning	Drainage and Leaching, Septic disposal
Stoddard Solvent (Hydrocarbons)	500 gal.	Solvent	Drainage and Leaching, Evaporation
Sulfuric Acid	30 gal.	Battery Acid	Drainage and Leaching
Toluene	50 gal.	Solvent	Drainage and Leaching
		Constituent of Fuels	Fuel Tank Leakage
1,1,1-Trichloroethane	500 gal.	Solvent	Evaporation, Drainage and Leaching
1,1,2-Trichloroethane	500 gal.	Solvent	Evaporation, Drainage and Leaching
Trichloroethene (Trichloroethylene)	500 gal.	Solvent	Evaporation, Drainage and Leaching
Tricresyl Phosphate	20 gal.	Special Lubricant	Drainage and Leaching
Zinc Chromate	100 lb.	Paint	Drainage and Leaching, POL Turn-In, Solid Waste Disposal

SECTION 8.0 - MASTER CONTAMINANTS LIST

8.1 GENERAL

Based on the previous analysis of site operations, this section presents the Master Contaminants List which consists of the potential contaminants of former NIKE sites. These contaminants should be investigated in the NIKE Preliminary Determination Phase (Phase II of this investigative program). As shown in Tables I and II, a number of many different substances were found to have potentially contaminated NIKE sites. Many of them, however, were not used in quantities that justify evaluation as a contaminant. Certain other substances that are potential contaminants were used erratically, and have an extremely small likelihood of being discovered on NIKE sites. Other possible contaminants have very brief life expectancies in the environment, and will no longer be present.

Also, further discussion is presented of criteria used for developing the Master List from the general inventory and discusses particular materials regarding their likelihood of being considered a potential site contaminant. The Master Contaminants List is presented as Table III at the conclusion of this Section.

8.2 MASTER LIST CONTAMINANTS

Each of the substances identified on the master list was used in significant quantities on NIKE sites and has a high probability of causing contamination. Most of the other materials identified in this investigation were eliminated from consideration since the volume of use on NIKE sites was small. Certain of the chemicals identified in previous investigations conducted by the United States Army Toxic and Hazardous Materials Agency were not included on the master list. The primary criteria for not including materials on the master list included:

- the materials were used only in small quantities,

- the materials were used with extreme care such that only minor quantities could have caused contamination and,

- the materials were reactive to the environment such that possible contamination from these materials would have dissipated rapidly with time.

Specific discussions of the substances comprising the master list, and of certain significant materials that were eliminated from the list, are presented in the following paragraphs. Materials on the Master List that represent additions relative to previous studies are so designated.

Benzene (New Listing)

Benzene was mentioned in Manual TM 9-1400-250-15/3. Benzene was probably in use as a solvent in the early stages of the NIKE program and was eliminated from updated standard equipment inventories. It remained in the text of the unrevised portions of the manual. Benzene was removed from military use due to its toxicity, much the same as was carbon tetrachloride. Benzene is also a common constituent of other solvents and fuels. Gasoline, for example, often contains significant amounts of benzene, so that NIKE site contamination from leaking fuel tanks or other solvent use increases the threat of benzene contamination.

Carbon Tetrachloride

As indicated in previous studies of NIKE sites (USATHMA DRXTH-AS-IA-83016), carbon tetrachloride was used in the early portions of the NIKE program. It is a superior solvent, and was used extensively for cleaning and degreasing.

Chromium (New Listing)

Chromium originates on NIKE sites in the cleaning materials chromium trioxide and sodium dichromate, as well as in zinc chromate and other paints.

Petroleum Hydrocarbons

Fuels, non-chlorinated solvents, naphthas, lubricants, paints, and hydraulic fluid all fall into the class of petroleum hydrocarbons. Because there are thousands of different but similar hydrocarbons, they are considered as a group when dealing with contamination from the materials mentioned above. In sheer quantity, hydrocarbons constitute the most significant potential contaminant of former NIKE sites.

Lead

Lead originates on NIKE sites in battery electrolyte and lead-based paints. Paint disposal at NIKE sites may have caused extensive contamination by lead.

Perchlorethylene (New Listing)

Interviews confirmed the use of perchloroethylene on NIKE sites. It was used as a solvent, probably after carbon tetrachloride use ceased, and before the introduction of trichloroethene and trichloroethanes. High volume use could be expected during that period.

Toluene

Toluene was specified as a cleaning solvent for missile components. It is also a major component of fuels and other solvents.

1,1,1-Trichloroethane, 1,1,2-Trichloroethane, and Trichloroethen

The use of these solvents was previously documented by USATHMA and was confirmed by this investigation.

8.3 OTHER MATERIALS CONSIDERED

The materials discussed in the following paragraphs are potential contaminants that were not placed on the master list of contaminants for the reasons previously discussed, but which warrant further discussion because they are mentioned in other source material as possible contaminants.

Unsymmetrical Dimethyl Hydrazine (UDMH)

UDMH was used in small amounts and stored for use in small sealed canisters. UDMH was carefully handled and controlled on NIKE sites. Spills very rarely occurred, and only intentional landfilling would present a contamination situation. In the environment, UDMH does not persist, because of its reactivity. UDMH will not occur on NIKE sites, except in sealed canisters, and will not be found in water or soil samples.

Ethylene Oxide

Ethylene oxide was used throughout the NIKE program as a fuel for the Accessory Power Supply (APS) system. This system burned ethylene oxide primarily to power missile guidance hydraulics. The system was tested periodically with a "hot run". Waste ethylene oxide was disposed of immediately by burning or dilution in water and on-site dumping. Ethylene oxide is a reactive, volatile liquid stored at low temperatures. (It has a boiling point of 11° Centigrade). In the environment, it decays in a very short time. No ethylene oxide will remain as a NIKE site contaminant.

Aniline and Furfuryl Alcohol

These starter fuels were not used in large quantities and pose very little contamination hazard.

JP-4

JP-4 is a hydrocarbon fuel. Contamination by JP-4 is considered along with other fuels under the hydrocarbon category.

Low-Level Radiation

Radiation resulting from electrical tube disposal caused extremely minute contamination with no associated hazard. Leakage from nuclear weapons did not occur to the best of our knowledge.

IRFNA (Nitric Acid)

IRFNA was an extremely hazardous material that was treated with great respect by NIKE site operators. Very little contamination via spillage occurred. The small amounts that were spilled rapidly reacted to become nitrates. Nitrates occur naturally in soils and are very commonly used as fertilizer. There is practically no chance that serious contamination of NIKE sites occurred as a result of the use of IRFNA.

Polychlorinated Biphenyls (PCBs)

PCBs were present on NIKE sites in permanent, sealed electric transformers. Small, erratic leakage of transformers probably occurred during site operation and after deactivation. Contamination resulting from PCB's would be small, localized, unpredictable, and unlikely to be discovered except from visual

observation of a leaking transformer. Therefore, PCBs were not included in the Master List for screening during the Preliminary Determination Phase. If PCB contamination is suspected, it will be investigated on a site specific basis.

Asbestos

Asbestos remains on-site in its original form in buildings, on piping and ductwork. It should be removed during demolition. Asbestos was not included on the Master List for screening during the Preliminary Determination Phase.

TABLE III
MASTER LIST OF SIGNIFICANT POTENTIAL NIKE SITE CONTAMINANTS

MATERIAL	USE CHARACTERISTICS	DISPOSAL METHOD
Benzene	Solvent	Evaporation, Drainage and Leaching
	General Solvent and Fuel Constituent	Fuel Tank Leakage
Carbon Tetrachloride (Tetrachloromethane)	Solvent	Evaporation, Drainage and Leaching
Chromium (Chromates, Chrome III, IV, and VI)	Decorroding Missile Parts	Drainage and Leaching, Surface Disposal
Petroleum Hydrocarbons	Fuels, Lubricants, Hydrocarbons	Consumed, Fuel Tank Leakage, Spillage to Soil, POL Turn-In, Drainagae and Leaching, Surface Disposal
Lead (Carbonates and Oxide)	Paints and Battery Electrolyte	Drainage and Leaching, POL Turn-In
Perchlorethylene (Tetrachloroethene)	Solvent	Evaporation, Drainage and Leaching
Toluene	Solvent Constituent of Fuels	Drainage and Leaching Fuel Tank Leakage
1,1,1-Trichloroethane	Solvent	Evaporation, Drainage and Leaching
1,1,2-Trichloroethane	Solvent	Evaporation, Drainage and Leaching
Trichloroethylene	Solvent	Evaporation, Drainage and Leaching

REFERENCES

1) USATHMA Historical Overview of the NIKE Missile System. December, 1984. DRXTH-AS-IA-83016

2) USATHMA Assessment of Contamination: Phoenix Military Reservation Launch Control Area. August, 1984. DRXTH-AS-CR-84296

3) USATHMA Fulton Property Survey. December, 1980. DAAK-79-C-0148

4) USATHMA Survey of the Former NIKE Site, Bristol, Rhode Island. December, 1980. DRXTH-IS-TR-81088

5) Personal Communication with five former NIKE site operators.

6) Personal Communication with military radiation safety personnel.

7) Personal Communication with municipal and industry representatives.

8) U.S.Army, NIKE Hercules Phaseout Plan. February, 1981.

9) U.S.Army, NIKE Hercules Inactivation Plan. February 1974.

10) U.S.Army, TM 9-1400-250-15/3. General and Preventative Maintenance Services (NIKE-Hercules and Improved NIKE-Hercules Air Defense Guided Missile System and NIKE-Hercules Anti-Tractical Ballistic Missile System). March, 1968.

11) U.S.Army, TM 9-1410-250-12/1. Operator and Organizational Maintenance Manual: Intercept-Aerial Guided Missile MIM-14A and MIM-14B.

12) U.S.Army, TM 9-1440-252-34. DS and GS Maintenance of the Hercules Monorail Launcher, Launching-Handling Rail, Side Truss, Loading Rack Support, Launcher-Transport Modification Kit, Launcher-Subsurface Four-Rack Modification Kit, and Launcher Basis Accessory Kit. August, 1960.

APPENDIX A

NIKE SITE LISTING FORMS

APPENDIX A
NIKE SITE LISTING FORMS

Appendix A consists of individual NIKE site listing forms for each of 280 CONUS NIKE sites. The initial working list of NIKE sites given in reference 1 presented 279 CONUS NIKE sites as well as 6 sites in Hawaii and 7 sites in Alaska for a total of 292 sites. This study was limited to the CONUS sites, so the Hawaii and Alaska sites were not researched.

The data given on the NIKE site listing forms was obtained in the summer of 1985 and is not considered current beyond that date. The data was obtained from 114 site reports on file at the Corps of Engineers Huntsville Division offices and from data presented by the Corps of Engineers District offices in response to specific written requests. The data requested from the District offices in many cases was not available and in such cases the forms are not complete. Certain spaces on the forms are left blank if data could not be obtained.

The sites are given by state with the states being listed in alphabetical order. The number of sites in each state is given in tabular form on the next sheet.

TABULAR LISTING OF NIKE SITES BY STATE

STATE	UMBER OF SITES
California	34
Connecticut	12
Florida	14
Georgia	4
Idaho	2
Illinois	20
Indiana	5
Iowa	1
Kansas	5
Louisiana	2
Maine	4
Maryland	18
Massachusetts	15
Michigan	15
Minnesota	4
Missouri	3
Nebraska	4
New Mexico	2
New Jersey	12
New York	18
Ohio	11
Pennsylvania	18
Rhode Island	5
South Dakota	4
Texas	9
Virginia	13
Washington	18
Wisconsin	8
	280
Hawaii	6
Alaska	7

NIKE SITE LISTING FORM

STATE : California

DESCRIPTION NUMBER: LA 04

PROJECTION LOCATION: Mount Gleason
(Angeles National Forest)

HND PROJECT NUMBER: J09 CA 003703

OWNERSHIP STATUS:

USDA - Forest Service, leased to California Department of Correction-Special use permits issued.

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND SPD (Tony Mei)

COMMENTS:

STATE : California

DESCRIPTION NUMBER: LA 09

PROJECTION LOCATION: Mt. Disappointment/Barley Flats
(Angeles National Forest)

HND PROJECT NUMBER: J09 CA 003706
J09 CA 003705

OWNERSHIP STATUS:

USDA - Forest Service-Special use permits issued

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND SPD (Tony Mei)

COMMENTS:

NIKE SITE LISTING FORM

STATE : California

DESCRIPTION NUMBER: LA 14

PROJECTION LOCATION: Whittier Narrows

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

STATE : California

DESCRIPTION NUMBER: LA 29

PROJECTION LOCATION: Brea

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

NIKE SITE LISTING FORM

STATE : California

DESCRIPTION NUMBER: LA 32

PROJECTION LOCATION: Los Alamitos

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

STATE : California

DESCRIPTION NUMBER: LA 40

PROJECTION LOCATION: Lakewood

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

ORIGINAL (Red)

NIKE SITE LISTING FORM

STATE : California

DESCRIPTION NUMBER: LA 4

PROJECTION LOCATION: Ft. MacArthur (White Point)

HND PROJECT NUMBER: J09 CA 001900

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SPD (Tony Mei)

COMMENTS:

STATE : California

DESCRIPTION NUMBER: LA 55

PROJECTION LOCATION: Point Vicente

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

NIKE SITE LISTING FORM

STATE : California

DESCRIPTION NUMBER: LA 57

PROJECTION LOCATION: Redondo Beach

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

STATE : California

DESCRIPTION NUMBER: LA 70

PROJECTION LOCATION: Playa Del Rey

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

NIKE SITE LISTING FORM

STATE : California

DESCRIPTION NUMBER: LA 7[illegible]

PROJECTION LOCATION: Playa Del Rey

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

STATE : California

DESCRIPTION NUMBER: LA 78

PROJECTION LOCATION: Saddle Peak (Santa Monica)

HND PROJECT NUMBER: J09 CA 000400

OWNERSHIP STATUS:

National Park Service

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND SPD (Tony Mei)

COMMENTS:

NIKE SITE LISTING FORM

STATE : California

DESCRIPTION NUMBER: LA 88

PROJECTION LOCATION: Oak Mountain

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

STATE : California

DESCRIPTION NUMBER: LA 94

PROJECTION LOCATION: Los Pinetos
(Angeles National Forest)

HND PROJECT NUMBER: J09 CA 003702

OWNERSHIP STATUS:

USDA - Forest Service - Special use permits issued

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

NIKE SITE LISTING FORM

STATE : California

DESCRIPTION NUMBER: LA 9[illegible]

PROJECTION LOCATION: Los Angeles Area

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

STATE : California

DESCRIPTION NUMBER: LA 96

PROJECTION LOCATION: Metro LA Area

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

NIKE SITE LISTING FORM

STATE : California

DESCRIPTION NUMBER: LA 98

PROJECTION LOCATION: Magic Mountain/Lang Station

HND PROJECT NUMBER: J09 CA 003701
J09 CA 003704

OWNERSHIP STATUS:

USDA - Forest Service - Special use permits issued

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND SPD (Tony Mei)

COMMENTS:

STATE : California

DESCRIPTION NUMBER: SF 25

PROJECTION LOCATION: Oakland

HND PROJECT NUMBER:

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SPKRE

COMMENTS:

NIKE SITE LISTING FORM

STATE : California

DESCRIPTION NUMBER: SF 3

PROJECTION LOCATION: Oakland

HND PROJECT NUMBER:

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SPKRE

COMMENTS:

STATE : California

DESCRIPTION NUMBER: SF 37

PROJECTION LOCATION: Alvarado

HND PROJECT NUMBER:

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SPKRE

COMMENTS:

NIKE SITE LISTING FORM

STATE : California

DESCRIPTION NUMBER: SF 51

PROJECTION LOCATION: Rockaway Beach

HND PROJECT NUMBER:

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SPKRE

COMMENTS:

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STATE : California

DESCRIPTION NUMBER: SF 59

PROJECTION LOCATION: San Francisco

HND PROJECT NUMBER:

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SPKRE

COMMENTS:

NIKE SITE LISTING FORM

STATE : California

DESCRIPTION NUMBER: SF 8

PROJECTION LOCATION: Ft. Barry

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SPKRE

COMMENTS:

No information

STATE : California

DESCRIPTION NUMBER: SF 88

PROJECTION LOCATION: Ft. Cronkhite

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SPKRE

COMMENTS:

No information

NIKE SITE LISTING FORM

STATE : California

DESCRIPTION NUMBER: SF 89

PROJECTION LOCATION: San Francisco

HND PROJECT NUMBER:

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SPKRE

COMMENTS:

STATE : California

DESCRIPTION NUMBER: SF 91

PROJECTION LOCATION: San Francisco

HND PROJECT NUMBER:

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SPKRE

COMMENTS:

NIKE SITE LISTING FORM

STATE : California

DESCRIPTION NUMBER: SF 9

PROJECTION LOCATION: San Rafael

HND PROJECT NUMBER:

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SPKRE

COMMENTS:

STATE : California

DESCRIPTION NUMBER: Site 61-R

PROJECTION LOCATION: San Francisco

HND PROJECT NUMBER:

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SPKRE

COMMENTS:

NIKE SITE LISTING FORM

STATE : California

DESCRIPTION NUMBER: AAA Battery 12

PROJECTION LOCATION: Berkeley

HND PROJECT NUMBER:

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SPKRE

COMMENTS:

STATE : California

DESCRIPTION NUMBER: SF 08-09

PROJECTION LOCATION: Berkeley

HND PROJECT NUMBER:

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SPKRE

COMMENTS:

NIKE SITE LISTING FORM

ORIGINAL (Red)

STATE : California

DESCRIPTION NUMBER: T 5

PROJECTION LOCATION: Fairfield/Travis AFB

HND PROJECT NUMBER:

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SPKRE

COMMENTS:

STATE : California

DESCRIPTION NUMBER: T 10

PROJECTION LOCATION: Elmira/Travis AFB

HND PROJECT NUMBER:

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SPKRE

COMMENTS:

NIKE SITE LISTING FORM

STATE : California

DESCRIPTION NUMBER: T 33

PROJECTION LOCATION: Vocaville/Travis AFB

HND PROJECT NUMBER:

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SPKRE

COMMENTS:

==========

STATE : California

DESCRIPTION NUMBER: T 86

PROJECTION LOCATION: Fairfield/Travis AFB

HND PROJECT NUMBER:

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SPKRE

COMMENTS:

NIKE SITE LISTING FORM

ORIGINAL (Red)

STATE : Connecticut

DESCRIPTION NUMBER: BR 07

PROJECTION LOCATION: Ansonia (Fairfield County)

HND PROJECT NUMBER: D01 CT 002400

OWNERSHIP STATUS:

Launch Area - Marjorie Lisa Ferguson

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : Connecticut

DESCRIPTION NUMBER: BR 15

PROJECTION LOCATION: West Haven

HND PROJECT NUMBER: D01 CT 001600

OWNERSHIP STATUS:

Probably DOD Control

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

NIKE SITE LISTING FORM

STATE : Connecticut

DESCRIPTION NUMBER: BR 17

PROJECTION LOCATION: Bridgeport

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: NANRE

COMMENTS:

STATE : Connecticut

DESCRIPTION NUMBER: BR 65

PROJECTION LOCATION: Fairfield

HND PROJECT NUMBER: D01 CT 005400

OWNERSHIP STATUS:

Town of Fairfield

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

NIKE SITE LISTING FORM

ORIGINAL (Red)

STATE : Connecticut

DESCRIPTION NUMBER: BR 73

PROJECTION LOCATION: Westport

HND PROJECT NUMBER: D01 CT 005500

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: NANRE

COMMENTS:

STATE : Connecticut

DESCRIPTION NUMBER: BR 94

PROJECTION LOCATION: Monroe (Shelton)

HND PROJECT NUMBER: D01 CT 001500

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: NANRE

COMMENTS:

NIKE SITE LISTING FORM

STATE : Connecticut

DESCRIPTION NUMBER: HA 08

PROJECTION LOCATION: East Windsor

HND PROJECT NUMBER: D01 CT 002500

OWNERSHIP STATUS:

Launch Area-DOD Control

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : Connecticut

DESCRIPTION NUMBER: HA 25

PROJECTION LOCATION: Hartford (Manchester)

HND PROJECT NUMBER: D01 CT 005600

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: NANRE

COMMENTS:

NIKE SITE LISTING FORM

ORIGINAL (Red)

STATE : Connecticut

DESCRIPTION NUMBER: HA 36

PROJECTION LOCATION: Portland

HND PROJECT NUMBER: D01 CT 005700

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: NANRE

COMMENTS:

STATE : Connecticut

DESCRIPTION NUMBER: HA 48

PROJECTION LOCATION: Cromwell

HND PROJECT NUMBER: D01 CT 005800

OWNERSHIP STATUS:

Launch Area - DOD Control

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

NIKE SITE LISTING FORM

STATE : Connecticut

DESCRIPTION NUMBER: HA 67

PROJECTION LOCATION: Plainville (Framingham)

HND PROJECT NUMBER: D01 CT 005900

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: NANRE

COMMENTS:

STATE : Connecticut

DESCRIPTION NUMBER: HA 85

PROJECTION LOCATION: Simsbury (Bloomfield)

HND PROJECT NUMBER: D01 CT 006000

OWNERSHIP STATUS:

Launch Area - RWR Associates

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

NIKE SITE LISTING FORM

STATE : Florida

DESCRIPTION NUMBER: HM 0

PROJECTION LOCATION: Richmond AFB

HND PROJECT NUMBER:

OWNERSHIP STATUS:

DOD Control (Air Force)

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SAJRE

COMMENTS:

STATE : Florida

DESCRIPTION NUMBER: HM 03

PROJECTION LOCATION: Broward County

HND PROJECT NUMBER:

OWNERSHIP STATUS:

DOD Control (Navy)

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SAJRE

COMMENTS:

NIKE SITE LISTING FORM

STATE : Florida

DESCRIPTION NUMBER: HM 12

PROJECTION LOCATION: Dade County

HND PROJECT NUMBER: I04 FL 008900

OWNERSHIP STATUS:

Harvey Rudich

LOCATION OF AS-BUILT DRAWINGS:

COE District Office

SOURCE OF INFORMATION: SAJRE

COMMENTS:

STATE : Florida

DESCRIPTION NUMBER: HM 39

PROJECTION LOCATION: Dade County

HND PROJECT NUMBER: I04 FL 008700

OWNERSHIP STATUS:

Curtis G. Poland

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SAJRE

COMMENTS:

NIKE SITE LISTING FORM

STATE : Florida

DESCRIPTION NUMBER: HM 46

PROJECTION LOCATION: Monroe County

HND PROJECT NUMBER:

OWNERSHIP STATUS:

DOD Control (Navy)

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SAJRE

COMMENTS:

STATE : Florida

DESCRIPTION NUMBER: HM 59

PROJECTION LOCATION: Dade County

HND PROJECT NUMBER: I04 FL 008800

OWNERSHIP STATUS:

State of Florida - Florida Department of Corrections

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SAJRE

COMMENTS:

NIKE SITE LISTING FORM

STATE : Florida

DESCRIPTION NUMBER: HM 69

PROJECTION LOCATION: Homestead

HND PROJECT NUMBER: I04 FL 000300

OWNERSHIP STATUS:

National Park Service (Everglades National Park)

LOCATION OF AS-BUILT DRAWINGS:

COE District Office

SOURCE OF INFORMATION: HND SAJRE

COMMENTS:

STATE : Florida

DESCRIPTION NUMBER: HM 84

PROJECTION LOCATION: Dade County

HND PROJECT NUMBER: I04 FL 09000

OWNERSHIP STATUS:

Harvey Rudich

LOCATION OF AS-BUILT DRAWINGS:

COE District Office

SOURCE OF INFORMATION: SAJRE

COMMENTS:

ORIGINAL (Red)

NIKE SITE LISTING FORM

STATE : Florida

DESCRIPTION NUMBER: HM 9

PROJECTION LOCATION: Miami

HND PROJECT NUMBER:

OWNERSHIP STATUS:

Launch Area - Permitted to Immigration Nationalization Service

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SAJRE

COMMENTS:

STATE : Florida

DESCRIPTION NUMBER: KW 10

PROJECTION LOCATION: Monroe County

HND PROJECT NUMBER:

OWNERSHIP STATUS:

DOD Control (Navy)

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SAJRE

COMMENTS:

NIKE SITE LISTING FORM

STATE : Florida

DESCRIPTION NUMBER: KW 24

PROJECTION LOCATION: Monroe County

HND PROJECT NUMBER:

OWNERSHIP STATUS:

DOD Control (Navy)

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SAJRE

COMMENTS:

STATE : Florida

DESCRIPTION NUMBER: KW 65

PROJECTION LOCATION: Monroe County

HND PROJECT NUMBER:

OWNERSHIP STATUS:

DOD Control (Navy)

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SAJRE

COMMENTS:

ORIGINAL (Red)

NIKE SITE LISTING FORM

STATE : Florida

DESCRIPTION NUMBER: KW 8[illegible]

PROJECTION LOCATION: Monroe County

HND PROJECT NUMBER:

OWNERSHIP STATUS:

DOD control (Army)

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SAJRE

COMMENTS:

STATE : Florida

DESCRIPTION NUMBER: KW 95

PROJECTION LOCATION: Monroe County

HND PROJECT NUMBER:

OWNERSHIP STATUS:

DOD Control (Navy)

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SAJRE

COMMENTS:

NIKE SITE LISTING FORM

STATE : Georgia

DESCRIPTION NUMBER: TU 28

PROJECTION LOCATION: Sylvester
(Worth County)

HND PROJECT NUMBER: I04 GA 039800

OWNERSHIP STATUS:

Launch Site - Lamar Ayers and R.E. Cline

LOCATION OF AS-BUILT DRAWINGS:

COE District Office

SOURCE OF INFORMATION: SASRE

COMMENTS:

STATE : Georgia

DESCRIPTION NUMBER: TU 79

PROJECTION LOCATION: Albany
(Lee County)

HND PROJECT NUMBER: I04 GA 039900

OWNERSHIP STATUS:

Launch Site - Hodges Family

LOCATION OF AS-BUILT DRAWINGS:

COE District Office

SOURCE OF INFORMATION: SASRE

COMMENTS:

NIKE SITE LISTING FORM

STATE : Georgia

DESCRIPTION NUMBER: R 28

PROJECTION LOCATION: Jeff rsonville (Twiggs County)

HND PROJECT NUMBER: I04 GA 057600

OWNERSHIP STATUS:

Launch Site - Twiggs County Board of Education

LOCATION OF AS-BUILT DRAWINGS:

COE District Office

SOURCE OF INFORMATION: SASRE

COMMENTS:

STATE : Georgia

DESCRIPTION NUMBER: R 88

PROJECTION LOCATION: Byron

HND PROJECT NUMBER: I04 GA 038500

OWNERSHIP STATUS:

Launch Site - Pyrotechnics, Inc.

LOCATION OF AS-BUILT DRAWINGS:

COE District Office

SOURCE OF INFORMATION: SASRE

COMMENTS:

NIKE SITE LISTING FORM

STATE : Idaho

DESCRIPTION NUMBER: MH 05

PROJECTION LOCATION: Elmore County (Mountain Home AFB)

HND PROJECT NUMBER:

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

Some data available at COE District Office

SOURCE OF INFORMATION: NPSRE

COMMENTS:

STATE : Idaho

DESCRIPTION NUMBER: MH 79

PROJECTION LOCATION: Elmore County (Mountain Home AFB)

HND PROJECT NUMBER:

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

Some data available at COE District Office

SOURCE OF INFORMATION: NPSRE

COMMENTS:

NIKE SITE LISTING FORM

STATE : Illinois

DESCRIPTION NUMBER: C 40

PROJECTION LOCATION: Chicago

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

STATE : Illinois

DESCRIPTION NUMBER: C 03

PROJECTION LOCATION: Chicago

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

[illegible] SITE LISTING FORM

STATE : Illinois

DESCRIPTION NUMBER: C 14

PROJECTION NOMENCLATURE: Chicago (W.W. Powers Conservation Area)

HND PROJECT NUMBER: [illegible] IL 020401

OWNERSHIP STATUS:

Illinois [illegible] Conservation - William W. Powers Conservation [illegible]

LOCATION OF AERIAL DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

STATE : Illinois

DESCRIPTION NUMBER: C 80

PROJECTION NOMENCLATURE: Arlington

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AERIAL DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

NIKE SITE LISTING FORM

STATE : Illinois

DESCRIPTION NUMBER: C 41

PROJECTION LOCATION: Chic. jo

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

STATE : Illinois

DESCRIPTION NUMBER: C 47

PROJECTION LOCATION: Porter

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

NIKE SITE LISTING FORM

STATE : Illinois

DESCRIPTION NUMBER: C 49

PROJECTION LOCATION: Homewood

END PROJECT NUMBER: E05 IL 007100

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

STATE : Illinois

DESCRIPTION NUMBER: C 51

PROJECTION LOCATION: Alsip (Cal-Sag Chan)

END PROJECT NUMBER: E05 IL 007200

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

NIKE SITE LISTING FORM

ORIGINAL (Red)

STATE : Illinois

DESCRIPTION NUMBER: C 54

PROJECTION LOCATION: Orla d Park

HND PROJECT NUMBER: E05 IL 007300

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

STATE : ILLINOIS

DESCRIPTION NUMBER: C 61

PROJECTION LOCATION: Chicago (Argonne Lab)

HND PROJECT NUMBER: E05 IL 007400

OWNERSHIP STATUS:

Launch Area - DOE Control (AEC)

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

NIKE SITE LISTING FORM

STATE : Illinois

DESCRIPTION NUMBER: C 70

PROJECTION LOCATION: Naperville

END PROJECT NUMBER: E05 IL 002700

OWNERSHIP ST[illegible]

[illegible] Bacofsky, Passon, Strombeck, Reiss & Company - [illegible]

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: ORLRE

COMMENTS:

STATE : Illinois

DESCRIPTION NUMBER: C 72

PROJECTION LOCATION: Addison

END PROJECT NUMBER: E05 IL 007500

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

NIKE SITE LISTING FORM

STATE : Illinois

DESCRIPTION NUMBER: C 80/81

PROJECTION LOCATION: Arli gton Heights

HND PROJECT NUMBER: E05 IL 007600

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

STATE : Illinois

DESCRIPTION NUMBER: C 84

PROJECTION LOCATION: Palatine

HND PROJECT NUMBER: E05 IL 007700

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

NIKE SITE LISTING FORM

STATE : Illinois

DESCRIPTION NUMBER: C 93

PRODUCTION LOCATION: Northfield

HND PROPERTY NUMBER: M05 IL 007900

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

STATE : Illinois

DESCRIPTION NUMBER: C 92/94

PRODUCTION LOCATION: Libertyville

HND PROPERTY NUMBER: M05 IL 007800

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

NIKE SITE LISTING FORM

STATE : Illinois

DESCRIPTION NUMBER: C 98

PROJECTION LOCATION: Ft. Sheridan

HND PROJECT NUMBER: E05 IL 008000

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

STATE : Illinois

DESCRIPTION NUMBER: SL 90

PROJECTION LOCATION: Grafton

HND PROJECT NUMBER: E05 IL 08300

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

NIKE SITE LISTING FORM

STATE : Illinois

DESCRIPTION NUMBER: SL 40

PROJECTION LOCATION: Monroe County (Hecker)

HND PROJECT NUMBER: E05 IL 008200

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

STATE : Illinois

DESCRIPTION NUMBER: SL 10

PROJECTION LOCATION: Madison County (Marine)

HND PROJECT NUMBER: E05 IL 008100

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

NIKE SITE LISTING FORM

ORIGIN (Red)

STATE : Indiana

DESCRIPTION NUMBER: C 48

PROJECTION LOCATION: Gary Lake County

HND PROJECT NUMBER: G05 IN 009200

OWNERSHIP STATUS:

Launch Area - Lake County - Used for Civil Defense Purposes

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : Indiana

DESCRIPTION NUMBER: C 45

PROJECTION LOCATION: Gary

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

[illegible] SITE LISTING FORM

STATE : Indiana

DESCRIPTION [illegible]: C 46

PROJECTION [illegible]: [illegible]ter

END [illegible]:

OWNERSHIP [illegible]:

LOCATION [illegible]:

SOURCE OF [illegible]:

COMMENTS:

STATE : Indiana

DESCRIPTION [illegible]: C 32

PROJECTION [illegible]: Porter County

END [illegible]:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

NIKE SITE LISTING FORM

ORIGINAL (Red)

STATE : Indiana

DESCRIPTION NUMBER: CD 63

PROJECTION LOCATION: Dearborn County

HND PROJECT NUMBER: G05 IN 011900

OWNERSHIP STATUS:

Launch Area - Linder Machinery Company

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

[illegible] SITE LISTING FORM

STATE : [illegible]

DESCRIPTION [illegible] 10

PROTECTION [illegible] Bluffs

HUD [illegible]

OWN[illegible]

[illegible] available

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SO[illegible]

CO[illegible]

NIKE SITE LISTING FORM

STATE : Kansas

DESCRIPTION NUMBER: KC 80

PROJECTION LOCATION: Leavenworth Co.

HND PROJECT NUMBER:

OWNERSHIP STATUS:

Edward H. Kracht - DOD Control - Launch Area not identified

LOCATION OF AS-BUILT DRAWINGS:

1139 Military Police Company
State Road KK
Pleasant Hill, MO 64080-9416

SOURCE OF INFORMATION: MRKRE

COMMENTS:

STATE : Kansas

DESCRIPTION NUMBER: KC 60

PROJECTION LOCATION: Johnson County

HND PROJECT NUMBER: B07 KS 015000

OWNERSHIP STATUS:

Unified School - District No. 231

LOCATION OF AS-BUILT DRAWINGS:

1139 Military Police Company
State Road KK
Pleasant Hill, MO 64080-9416

SOURCE OF INFORMATION: MRKRE

COMMENTS:

ORIGINAL (Red)

[illegible] LISTING FORM

STATE : [illegible]

DESCRIPTION [illegible]

PROJ[illegible] (Johnson County)

HND [illegible] 014800

OWN[illegible]

LOC[illegible]

SOU[illegible]

CO[illegible]

[illegible]adquarters

STA[illegible]

DESCR[illegible]

PRO[illegible] County

HND [illegible] 016300

OWNERSHIP [illegible]

LOCATION OF [illegible]

SOURCE OF [illegible]

COMMENTS:

NIKE SITE LISTING FORM

STATE : Kansas

DESCRIPTION NUMBER: SC 50

PROJECTION LOCATION: Saline County

END PROJECT NUMBER: B07 KS 016400

OWNERSHIP STATUS:

F.J. Rytych - J.V. McInc. - Launch Area not identified

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: MRKRE

COMMENTS:

ORIGINAL (Red)

LISTING FORM

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PR City

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Used by School of Medicine

LOCA

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CONT

NIKE SITE LISTING FORM

ORIGIN (Red)

STATE : Maine

DESCRIPTION NUMBER: LO 13

PROJECTION LOCATION: Caswell

HND PROJECT NUMBER: D01 ME 002800

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: NANRE

COMMENTS:

STATE : Maine

DESCRIPTION NUMBER: LO 31

PROJECTION LOCATION: Limestone

HND PROJECT NUMBER: D01 ME 007600

OWNERSHIP STATUS:

Launch Area - Calvin West

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

NIKE SITE LISTING FORM

STATE : Maine

DESCRIPTION NUMBER: L0 58

PROJECTION LOCATION: Caribou

END PROJECT NUMBER: D01 ME 007700

OWNERSHIP STATUS:

Launch Area - Veterans of Foreign Wars (VFW)

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: END

COMMENTS:

STATE : Maine

DESCRIPTION NUMBER: L0 85

PROJECTION LOCATION: Connor

END PROJECT NUMBER: D01 ME 007800

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: NANRE

COMMENTS:

NIKE SITE LISTING FORM

STATE : Maryland

DESCRIPTION NUMBER: W 54

PROJECTION LOCATION: LaPlata (Pomonkey)

HND PROJECT NUMBER: CO3 MD 024300

OWNERSHIP STATUS:

Launch area is location of the U.S. Naval Research Laboratory Pomonkey Test Range

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : Maryland

DESCRIPTION NUMBER: BA 03

PROJECTION LOCATION: Phoenix

HND PROJECT NUMBER: CO3 MD 007300

OWNERSHIP STATUS:

Launch Area - Maryland National Guard Baltimore County Fire Department

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND/NABRE

COMMENTS:

USATHAMA report of contamination issued August 1984

NIKE SITE LISTING FORM

STATE : Maryland

DESCRIPTION NUMBER: BA 09

PROJECTION LOCATION: FORK

HND PROJECT NUMBER: CO3 MD 023400

OWNERSHIP STATUS:

Launch Area - GSA - Leased to Baltimore County Police Department

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : Maryland

DESCRIPTION NUMBER: W 25

PROJECTION LOCATION: Davidsonville

HND PROJECT NUMBER: CO3 MD 023700

OWNERSHIP STATUS:

Major portion - Anne Arundel County

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: NABRE

COMMENTS:

NIKE SITE LISTING FORM

STATE : Maryland

DESCRIPTION NUMBER: W 26

PROJECTION LOCATION: Annapolis

HND PROJECT NUMBER: CO3 MD 023600

OWNERSHIP STATUS:

DOD Control (Navy)

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : Maryland

DESCRIPTION NUMBER: BA 30/31

PROJECTION LOCATION: Chesterton

HND PROJECT NUMBER: CO3 MD 023700

OWNERSHIP STATUS:

Launch Area - Deeded to Kent County, Department of Parks & Recreation

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

NIKE SITE LISTING FORM

STATE : Maryland

DESCRIPTION NUMBER: W 45

PROJECTION LOCATION: LaPlata (Waldorf)

HND PROJECT NUMBER: CO3 MD 024200

OWNERSHIP STATUS:

DOD Control (Navy)

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : Maryland

DESCRIPTION NUMBER: W 34

PROJECTION LOCATION: Suitland

HND PROJECT NUMBER: CO3 MD 9200

OWNERSHIP STATUS:

Smithsonian Institution

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

Not a Launch site.

NIKE SITE LISTING FORM

STATE : Maryland

DESCRIPTION NUMBER: W 35

PROJECTION LOCATION: Cloon (Upper Marlboro)

HND PROJECT NUMBER: CO3 MD 023900

OWNERSHIP STATUS:

Launch Area - Deeded to Prince Georges County (Board of Education)

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : Maryland

DESCRIPTION NUMBER: W 44

PROJECTION LOCATION: Waldorf

HND PROJECT NUMBER: CO3 MD 024100

OWNERSHIP STATUS:

Launch Area - Controlled by Maryland Indian Heritage Society - Possibly Still Owned by DOD

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

NIKE SITE LISTING FORM

STATE : Maryland

DESCRIPTION NUMBER: BA 79 (W 05)

PROJECTION LOCATION: Granite

HND PROJECT NUMBER: CO3 MD 007312

OWNERSHIP STATUS:

Launch Area - Deeded to State of Maryland (Correctional Training Commission) Used by Baltimore County Police Department

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : Maryland

DESCRIPTION NUMBER: W 92

PROJECTION LOCATION: Rockville

HND PROJECT NUMBER: CO3 MD 024500

OWNERSHIP STATUS:

Launch Area is Administered By The National Bureau of Standards

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

NIKE SITE LISTING FORM

STATE : Maryland

DESCRIPTION NUMBER: W 93

PROJECTION LOCATION: Olney

HND PROJECT NUMBER: C03 MD 024700

OWNERSHIP STATUS:

Launch Area - Federal Emergency Management Agency - Portion Leased to Maryland National Guard

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : Maryland

DESCRIPTION NUMBER: W 94

PROJECTION LOCATION: Rockville (Laytonsville)

HND PROJECT NUMBER: C03 MD 024800

OWNERSHIP STATUS:

DOD Control

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

NIKE SITE LISTING FORM

STATE : Maryland

DESCRIPTION NUMBER: BA 92

PROJECTION LOCATION: Towson (Baltimore County)

HND PROJECT NUMBER: CO3 MD 024600

OWNERSHIP STATUS:

Launch Area - Cross Street Poultry Company, Inc.

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : Maryland

DESCRIPTION NUMBER: BA 43

PROJECTION LOCATION: Annapolis (Anne Arundel Cty)

HND PROJECT NUMBER: CO3 MD 024000

OWNERSHIP STATUS:

Anne Arundel County Public Schools

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

NIKE SITE LISTING FORM

ORIGINAL (Red)

STATE : Maryland

DESCRIPTION NUMBER: W 36

PROJECTION LOCATION: Upper Marlboro (Croom)

HND PROJECT NUMBER: C03 MD 023800

OWNERSHIP STATUS:

Launch Area - Auction Systems Inc. - Melvin E. Richards

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : Maryland

DESCRIPTION NUMBER: BA 18

PROJECTION LOCATION: Army Chemical Center

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

NIKE SITE LISTING FORM

STATE : Massachusetts

DESCRIPTION NUMBER: None Identifiable

PROJECTION LOCATION: Randolph

HND PROJECT NUMBER: DO1 MA 003900

OWNERSHIP STATUS:

Launch Area - Commonwealth of Massachusetts, Metropolitan District Commission (M.D.C.)

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : Massachusetts

DESCRIPTION NUMBER: B 03

PROJECTION LOCATION: Reading (Wakefield)

HND PROJECT NUMBER: DO1 MA 006400

OWNERSHIP STATUS:

Launch Area - Town of Reading

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

NIKE SITE LISTING FORM

STATE : Massachusetts

DESCRIPTION NUMBER: B 05

PROJECTION LOCATION: Danvers (Topsfield)

HND PROJECT NUMBER: D01 MA 006500

OWNERSHIP STATUS:

Launch Area - Deeded to Towns of Salem and Beverly

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : Massachusetts

DESCRIPTION NUMBER: B 15

PROJECTION LOCATION: Beverly

HND PROJECT NUMBER: D01 MA 006600

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: NANRE

COMMENTS:

NIKE SITE LISTING FORM

STATE : Massachusetts

DESCRIPTION NUMBER: B 17

PROJECTION LOCATION: Nahant

HND PROJECT NUMBER: D01 MA 006700

OWNERSHIP STATUS:

Could not be identified

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : Massachusetts

DESCRIPTION NUMBER: B 36

PROJECTION LOCATION: Weymouth

HND PROJECT NUMBER: D01 MA 006800

OWNERSHIP STATUS:

Launch Area - Commonwealth of Massachusetts, Department of Environmental Management (DEM)

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

NIKE SITE LISTING FORM

STATE : Massachusetts

DESCRIPTION NUMBER: B 37

PROJECTION LOCATION: Quincy (Boston Harbor)

HND PROJECT NUMBER: DO1 MA 006900

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: NANRE

COMMENTS:

STATE : Massachusetts

DESCRIPTION NUMBER: B 38

PROJECTION LOCATION: Hingham/Cohasset

HND PROJECT NUMBER: DO1 MA 007000

OWNERSHIP STATUS:

Launch Area - Commonwealth of Massachusetts, Department of Public Works

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

NIKE SITE LISTING FORM

STATE : Massachusetts

DESCRIPTION NUMBER: B 63

PROJECTION LOCATION: Needham

HND PROJECT NUMBER: D01 MA 007100

OWNERSHIP STATUS:

Launch Area - Town of Needham

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : Massachusetts

DESCRIPTION NUMBER: B 73

PROJECTION LOCATION: Lincoln

HND PROJECT NUMBER: D01 MA 007200

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: NANRE

COMMENTS:

NIKE SITE LISTING FORM

ORIGINAL (Red)

STATE : Massachusetts

DESCRIPTION NUMBER: B 84

PROJECTION LOCATION: Birlington/Woburn

HND PROJECT NUMBER: D01 MA 007300

OWNERSHIP STATUS:

Launch Area - Deeded to Northeastern University

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : Massachusetts

DESCRIPTION NUMBER: B 85

PROJECTION LOCATION: Bedford

HND PROJECT NUMBER: D01 MA 007400

OWNERSHIP STATUS:

Launch Area - President and Fellows of Harvard College

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

NIKE SITE LISTING FORM

STATE : Massachusetts

DESCRIPTION NUMBER: PR 19 (B 19)

PROJECTION LOCATION: Rehoboth

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: NANRE

COMMENTS:

STATE : Massachusetts

DESCRIPTION NUMBER: PR 29

PROJECTION LOCATION: Swansea

HND PROJECT NUMBER: DOI MA 007500

OWNERSHIP STATUS:

Launch Area - Frohman Anderson

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

NIKE SITE LISTING FORM

STATE : Massachusetts

DESCRIPTION NUMBER: B 55

PROJECTION LOCATION: B'ue Hills

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

May not be a site - Should be checked

NIKE SITE LISTING FORM

STATE : Michigan

DESCRIPTION NUMBER: D 15

PROJECTION LOCATION: Selfridge AFB

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

STATE : Michigan

DESCRIPTION NUMBER: D 17

PROJECTION LOCATION: St. Clair County (Marine City)

HND PROJECT NUMBER: E05 MI 011700

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

NIKE SITE LISTING FORM

STATE : Michigan

DESCRIPTION NUMBER: D 06

PROJECTION LOCATION: Utica

HND PROJECT NUMBER: E05 MI 012100

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

STATE : Michigan

DESCRIPTION NUMBER: D 14

PROJECTION LOCATION: Macomb County (Mt. Clemens)

HND PROJECT NUMBER: E05 MI 012200

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

NIKE SITE LISTING FORM

STATE : Michigan

DESCRIPTION NUMBER: D 16

PROJECTION LOCATION: Selfridge AFB

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

STATE : Michigan

DESCRIPTION NUMBER: D 23-26

PROJECTION LOCATION: Wayne County (Detroit)

HND PROJECT NUMBER: E05 MI 012500

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

ORIGINAL (Red)

NIKE SITE LISTING FORM

STATE : Michigan

DESCRIPTION NUMBER: D 51

PROJECTION LOCATION: Wayne County (Grosse Isle)

HND PROJECT NUMBER: E05 MI 012300

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

STATE : Michigan

DESCRIPTION NUMBER: D 54-55

PROJECTION LOCATION: Riverview

HND PROJECT NUMBER: E05 MI 011500

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

NIKE SITE LISTING FORM

STATE : Michigan

DESCRIPTION NUMBER: D 61

PROJECTION LOCATION: Wayne County

HND PROJECT NUMBER: E05 MI 012400

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

STATE : Michigan

DESCRIPTION NUMBER: D 86

PROJECTION LOCATION: Oakland County (Franklin)

HND PROJECT NUMBER: E05 MI 011800

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

ORIGINAL (Red)

NIKE SITE LISTING FORM

STATE : Michigan

DESCRIPTION NUMBER: D 87

PROJECTION LOCATION: Union Lake

HND PROJECT NUMBER: E05 MI 011900

OWNERSHIP STATUS:

Controlled by Michigan Department of Natural Resources - Parks Division

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : Michigan

DESCRIPTION NUMBER: D 58

PROJECTION LOCATION: Carleton

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

ORIGINAL (Red)

NIKE SITE LISTING FORM

STATE : Michigan

DESCRIPTION NUMBER: D 97

PROJECTION LOCATION: Auburn Hts. (Pontiac)

HND PROJECT NUMBER: E05 MI 012000

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

NIKE SITE LISTING FORM

STATE : Minnesota

DESCRIPTION NUMBER: MS 40

PROJECTION LOCATION: Framington

HND PROJECT NUMBER:

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: MRORE

COMMENTS:

STATE : Minnesota

DESCRIPTION NUMBER: MS 90

PROJECTION LOCATION: Bethel

HND PROJECT NUMBER:

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: MRORE

COMMENTS:

NIKE SITE LISTING FORM

STATE : Michigan

DESCRIPTION NUMBER: D 57-58

PROJECTION LOCATION: Newport

HND PROJECT NUMBER: E05 MI 011600

OWNERSHIP STATUS:

Primarily DOD control

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : Michigan

DESCRIPTION NUMBER: D 69

PROJECTION LOCATION: Detroit

HND PROJECT NUMBER: E05 MI 012600

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

NIKE SITE LISTING FORM

STATE : Minnesota

DESCRIPTION NUMBER: MS 70

PROJECTION LOCATION: Minneapolis

HND PROJECT NUMBER:

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: MRORE

COMMENTS:

STATE : Minnesota

DESCRIPTION NUMBER: MS 20

PROJECTION LOCATION: St. Paul

HND PROJECT NUMBER:

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: MRORE

COMMENTS:

NIKE SITE LISTING FORM

STATE : Missouri

DESCRIPTION NUMBER: KC 10

PROJECTION LOCATION: Ray County

HND PROJECT NUMBER:

OWNERSHIP STATUS:

Lawson Schools R-XII

LOCATION OF AS-BUILT DRAWINGS:

1139 Military Police Company
State Road KK
Pleasant Hill, MO 64080-9416

SOURCE OF INFORMATION: MRKRE

COMMENTS:

STATE : Missouri

DESCRIPTION NUMBER: KC 30

PROJECTION LOCATION: Cass County

HND PROJECT NUMBER:

OWNERSHIP STATUS:

W.R. Gibson Development Company - Kansas City National Guard - Launch Area Not Identified

LOCATION OF AS-BUILT DRAWINGS:

1139 Military Police Company
State Road KK
Pleasant Hill, MO 64080-9416

SOURCE OF INFORMATION: MRKRE

COMMENTS:

ORIGINAL (Red)

NIKE SITE LISTING FORM

STATE : Missouri

DESCRIPTION NUMBER: SL 60

PROJECTION LOCATION: Pacific

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

NIKE SITE LISTING FORM

STATE : Nebraska

DESCRIPTION NUMBER: LI 01

PROJECTION LOCATION: Lincoln

HND PROJECT NUMBER: B07 NE 007500

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: MRORE

COMMENTS:

STATE : Nebraska

DESCRIPTION NUMBER: LI 50

PROJECTION LOCATION: Crete

HND PROJECT NUMBER: B07 NE 007600

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: MRORE

COMMENTS:

NIKE SITE LISTING FORM

STATE : Nebraska

DESCRIPTION NUMBER: OF 60

PROJECTION LOCATION: Plattsmouth (Cass County)

HND PROJECT NUMBER: B07 NE 008200

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: MRORE

COMMENTS:

STATE : Nebraska

DESCRIPTION NUMBER: OF 10

PROJECTION LOCATION: Plattsmouth (Iowa County)

HND PROJECT NUMBER: B08 NE 008100

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: MRORE

COMMENTS:

NIKE SITE LISTING FORM

STATE : New Mexico

DESCRIPTION NUMBER: WA 10

PROJECTION LOCATION: Walker AFB

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

STATE : New Mexico

DESCRIPTION NUMBER: WA 50

PROJECTION LOCATION: Walker AFB

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

NIKE SITE LISTING FORM

STATE : New Jersey

DESCRIPTION NUMBER: NY 80

PROJECTION LOCATION: Morristown (Essex County)

HND PROJECT NUMBER: CO2 NJ 003700

OWNERSHIP STATUS:

Launch Area - GSA Control

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : New Jersey

DESCRIPTION NUMBER: PH 58

PROJECTION LOCATION: Swedesboro

HND PROJECT NUMBER: CO2 NJ 004400

OWNERSHIP STATUS:

GSA Control

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

NIKE SITE LISTING FORM

STATE : New Jersey

DESCRIPTION NUMBER: NY 60

PROJECTION LOCATION: South Amboy

HND PROJECT NUMBER: CO2 NJ 004600

OWNERSHIP STATUS:

Launch Area - Old Bridge Township Board of Education

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : New Jersey

DESCRIPTION NUMBER: NY 65

PROJECTION LOCATION: South Plainfield

HND PROJECT NUMBER: CO2 NJ 005000

OWNERSHIP STATUS:

Launch Area - Private, being prepared for construction of Hadley Shopping Plaza

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

NIKE SITE LISTING FORM

STATE : New Jersey

DESCRIPTION NUMBER: NY 54

PROJECTION LOCATION: Holmdel

HND PROJECT NUMBER: CO2 NJ 005100

OWNERSHIP STATUS:

Launch Area - Monmouth County

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

All NIKE site facilities removed

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STATE : New Jersey

DESCRIPTION NUMBER: PH 41/43

PROJECTION LOCATION: Glassboro

HND PROJECT NUMBER: CO2 NJ 005300

OWNERSHIP STATUS:

GSA Control

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

ORIGINAL (Red)

NIKE SITE LISTING FORM

STATE : New Jersey

DESCRIPTION NUMBER: NY 93/94

PROJECTION LOCATION: Mahwah

HND PROJECT NUMBER: CO2 NJ 005400

OWNERSHIP STATUS:

Launch Area - Major portion High Debi/Hills Corporation

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : New Jersey

DESCRIPTION NUMBER: PH 32

PROJECTION LOCATION: Marlton

HND PROJECT NUMBER: CO2 NJ 005500

OWNERSHIP STATUS:

Launch Area - Evesham Board of Education

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

NIKE SITE LISTING FORM

STATE : New Jersey

DESCRIPTION NUMBER: NY 73

PROJECTION LOCATION: Summit

HND PROJECT NUMBER: CO2 NJ 005600

OWNERSHIP STATUS:

Launch Area - Union County, Division of Parks and Recreation

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

No NIKE facilities remain on site

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STATE : New Jersey

DESCRIPTION NUMBER: NY 88

PROJECTION LOCATION: Mountain View

HND PROJECT NUMBER: CO2 NJ 005800

OWNERSHIP STATUS:

Launch Area - Wayne Township Board of Education

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

ORIGINAL (Red)

NIKE SITE LISTING FORM

STATE : New Jersey

DESCRIPTION NUMBER: PH 23/25

PROJECTION LOCATION: Mt. Holly

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: NANRE

COMMENTS:

STATE : New Jersey

DESCRIPTION NUMBER: PH 49

PROJECTION LOCATION: Richwood

HND PROJECT NUMBER: CO2 NJ 006400

OWNERSHIP STATUS:

Launch Area - Kraemer Industrial Park

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

NIKE SITE LISTING FORM

STATE : New York

DESCRIPTION NUMBER: NY 49

PROJECTION LOCATION: Ft. Tilden

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: NANRE

COMMENTS:

STATE : New York

DESCRIPTION NUMBER: NY 04/05

PROJECTION LOCATION: Orangetown

HND PROJECT NUMBER: CO2 NY 006500

OWNERSHIP STATUS:

Launch Area - 24 Acres Town of Orange Town (no facilities) - - Remainder DOD Control

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

ORIGINAL (Red)

NIKE SITE LISTING FORM

STATE : New York

DESCRIPTION NUMBER: NY 25

PROJECTION LOCATION: Brookhaven

HND PROJECT NUMBER: CO2 NY 006600

OWNERSHIP STATUS:

Launch Area - DOD Control (Army Reserve Facility)

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : New York

DESCRIPTION NUMBER: NY 99

PROJECTION LOCATION: Ramapo

HND PROJECT NUMBER: CO2 NY 006700

OWNERSHIP STATUS:

Launch Area - Ramapo Central School District No. 2

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

NIKE SITE LISTING FORM

STATE : New York

DESCRIPTION NUMBER: NY 20

PROJECTION LOCATION: Huntington

HND PROJECT NUMBER: CO2 NY 006800

OWNERSHIP STATUS:

Launch Area - subdivided into nine parcels owned by private individuals

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

No NIKE facilities remain on launch area site

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STATE : New York

DESCRIPTION NUMBER: NY 24

PROJECTION LOCATION: Babylon

HND PROJECT NUMBER: CO2 NY 006900

OWNERSHIP STATUS:

Launch Area - DOD Control (Army Reserve Center)

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

NIKE SITE LISTING FORM

STATE : New York

DESCRIPTION NUMBER: NY 09

PROJECTION LOCATION: Kensico (White Plains)

HND PROJECT NUMBER: CO2 NY 009400

OWNERSHIP STATUS:

Launch Area - Major portion town of Harrison

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : New York

DESCRIPTION NUMBER: NY 23

PROJECTION LOCATION: Oyster Bay

HND PROJECT NUMBER: CO2 NY 008900

OWNERSHIP STATUS:

Launch Area - Deeded to Board of Cooperative Education Services of Nassau County

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

NIKE SITE LISTING FORM

STATE : New York

DESCRIPTION NUMBER: NY 29/30

PROJECTION LOCATION: Lido Beach

HND PROJECT NUMBER: CO2 NY 009000

OWNERSHIP STATUS:

Launch Area - Deeded to city School District of the City of Long Beach

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : New York

DESCRIPTION NUMBER: NF 03

PROJECTION LOCATION: Lewiston

HND PROJECT NUMBER: CO2 NY 007400

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: NANRE

COMMENTS:

NIKE SITE LISTING FORM

STATE : New York

DESCRIPTION NUMBER: BU 09

PROJECTION LOCATION: Buffalo

HND PROJECT NUMBER: CO2 NY 009100

OWNERSHIP STATUS:

Launch Area - Portion of town of Amherst-Portion deeded to V.M. McGee

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : New York

DESCRIPTION NUMBER: NF 16

PROJECTION LOCATION: Cambria

HND PROJECT NUMBER: CO2 NY 009300

OWNERSHIP STATUS:

Launch Area - Subdivided into multiple parcels owned by private individuals

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

NIKE SITE LISTING FORM

STATE : New York

DESCRIPTION NUMBER: BU 18

PROJECTION LOCATION: Lancaster

HND PROJECT NUMBER: CO2 NY 007600

OWNERSHIP STATUS:

Launch Area (major portion) - First Squared Element Company

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : New York

DESCRIPTION NUMBER: BU 34/35

PROJECTION LOCATION: Aurora

HND PROJECT NUMBER: CO2 NY 007700

OWNERSHIP STATUS:

Launch Area - H.G.M. Land Corporation

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

NIKE SITE LISTING FORM

STATE : New York

DESCRIPTION NUMBER: NF 41

PROJECTION LOCATION: Grand Island

HND PROJECT NUMBER: CO2 NY 007800

OWNERSHIP STATUS:

Launch Area - Deeded to Grand Island Central School District

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : New York

DESCRIPTION NUMBER: BU 51/52

PROJECTION LOCATION: Hanburg

HND PROJECT NUMBER: CO2 NY 007900

OWNERSHIP STATUS:

Could not be identified

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

NIKE SITE LISTING FORM

STATE : New York

DESCRIPTION NUMBER: NY 56

PROJECTION LOCATION: Ft. Hancock

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: NANRE

COMMENTS:

STATE : New York

DESCRIPTION NUMBER: NY 15

PROJECTION LOCATION: Ft. Slocum

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: NANRE

COMMENTS:

NIKE Battery was apparently never constructed
(NANRE letter 5 Aug 85)

NIKE SITE LISTING FORM

STATE : Ohio

DESCRIPTION NUMBER: CD 46

PROJECTION LOCATION: Felicity

HND PROJECT NUMBER: G05 OH 004500

OWNERSHIP STATUS:

Owned in fee by Department of Army - Leased to the State of Ohio, used by Ohio National Guard

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : Ohio

DESCRIPTION NUMBER: CL 67

PROJECTION LOCATION: Cleveland

HND PROJECT NUMBER: G05 OH 005400

OWNERSHIP STATUS:

City of Cleveland (Burke Airport)

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

Site used as active airport

NIKE SITE LISTING FORM

STATE : Ohio

DESCRIPTION NUMBER: CL 48

PROJECTION LOCATION: Cuyahoga Co. (Cleveland)

HND PROJECT NUMBER: G05 OH 005200

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

STATE : Ohio

DESCRIPTION NUMBER: CL 69

PROJECTION LOCATION: Cuyahoga County (Fairview Park)

HND PROJECT NUMBER: G05 OH 004700

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

ORIGINAL (Red)

NIKE SITE LISTING FORM

STATE : Ohio

DESCRIPTION NUMBER: CL 13

PROJECTION LOCATION: Lake County (Willowick)

HND PROJECT NUMBER: G05 OH 005000

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

STATE : Ohio

DESCRIPTION NUMBER: CD 27

PROJECTION LOCATION: Wilmington

HND PROJECT NUMBER: G05 OH 004400

OWNERSHIP STATUS:

Portion deeded to Clinton County Board of Commissioners - Portion apparently sold to unidentified private ownership

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

NIKE SITE LISTING FORM

STATE : Ohio

DESCRIPTION NUMBER: CD 78

PROJECTION LOCATION: Oxford

HND PROJECT NUMBER: G05 OH 004600

OWNERSHIP STATUS:

Launch Area - Deeded to the Board of Trustees of Miami University

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : Ohio

DESCRIPTION NUMBER: CL 02

PROJECTION LOCATION: Bratenahl

HND PROJECT NUMBER: G05 OH 004800

OWNERSHIP STATUS:

Launch Area - DOD Control

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

NIKE SITE LISTING FORM

STATE : Ohio

DESCRIPTION NUMBER: CL 11

PROJECTION LOCATION: Painesville

HND PROJECT NUMBER: G05 OH 004900

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

STATE : Ohio

DESCRIPTION NUMBER: CL 34

PROJECTION LOCATION: Warrensville

HND PROJECT NUMBER: G05 OH 005100

OWNERSHIP STATUS:

Deeded to City of Cleveland

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

NIKE SITE LISTING FORM

STATE : Ohio

DESCRIPTION NUMBER: CL 59

PROJECTION LOCATION: Parma

HND PROJECT NUMBER: G05 OH 005300

OWNERSHIP STATUS:

Subdivided between City of Parma, City of Parma Heights, Cuyahoga Community College

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

Site reconstructed into park facilities

NIKE SITE LISTING FORM

STATE : Pennsylvania

DESCRIPTION NUMBER: PI 02

PROJECTION LOCATION: Rural Ridge

HND PROJECT NUMBER: CO3 PA 007001

OWNERSHIP STATUS:

Launch Area - Pennsylvania Department of Transportation (Penn DOT)

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : Pennsylvania

DESCRIPTION NUMBER: PI 03

PROJECTION LOCATION: West Deer Township

HND PROJECT NUMBER: CO3 PA 003400

OWNERSHIP STATUS:

Launch Area - Deeded to Council of Three Rivers American Indian Center Inc. and/or West Deer Township

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

NIKE SITE LISTING FORM

STATE : Pennsylvania

DESCRIPTION NUMBER: PI 36

PROJECTION LOCATION: Irwin, North Huntingdon Township

HND PROJECT NUMBER: CO3 PA 022200

OWNERSHIP STATUS:

Launch Area - DOD Control

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : Pennsylvania

DESCRIPTION NUMBER: PI 25

PROJECTION LOCATION: Murrysville

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

NIKE SITE LISTING FORM

STATE : Pennsylvania

DESCRIPTION NUMBER: PI 37

PROJECTION LOCATION: Herminie

HND PROJECT NUMBER: CO3 PA 022300

OWNERSHIP STATUS:

Launch Area - Peter Zizan

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : Pennsylvania

DESCRIPTION NUMBER: PI 43

PROJECTION LOCATION: Elrama

HND PROJECT NUMBER: CO3 PA 002400

OWNERSHIP STATUS:

DOD Control (Army)

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

NIKE SITE LISTING FORM

STATE : Pennsylvania

DESCRIPTION NUMBER: PI 52

PROJECTION LOCATION: Hickman

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

STATE : Pennsylvania

DESCRIPTION NUMBER: PI 62

PROJECTION LOCATION: Bryant

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

ORIGINAL (Red)

NIKE SITE LISTING FORM

STATE : Pennsylvania

DESCRIPTION NUMBER: PI 71

PROJECTION LOCATION: Coraopolis

HND PROJECT NUMBER: C03 PA 022500

OWNERSHIP STATUS:

Launch Area - Deeded to Lang Machinery Company

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : Pennsylvania

DESCRIPTION NUMBER: PI 92

PROJECTION LOCATION: Pittsburgh (North Park)

HND PROJECT NUMBER: C03 PA 022600

OWNERSHIP STATUS:

Launch Area - Allegheny County (Police and Fire Department Training Academy)

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

NIKE SITE LISTING FORM

STATE : Pennsylvania

DESCRIPTION NUMBER: PI 93

PROJECTION LOCATION: Ross, Ohio Townships

HND PROJECT NUMBER: CO3 PA 022700

OWNERSHIP STATUS:

Launch Area - Subdivided into 49 individual lots with 48 single family homes.

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : Pennsylvania

DESCRIPTION NUMBER: PH 07

PROJECTION LOCATION: Richboro, Northampton Township

HND PROJECT NUMBER: CO3 PA 007200

OWNERSHIP STATUS:

Launch Area - Township of Northampton

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

NIKE SITE LISTING FORM

STATE : Pennsylvania

DESCRIPTION NUMBER: PH 15

PROJECTION LOCATION: Bristol

HND PROJECT NUMBER: C03 PA 022800

OWNERSHIP STATUS:

Launch Area - DOD Control (Army)

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : Pennsylvania

DESCRIPTION NUMBER: PH 67

PROJECTION LOCATION: Aston Township (Village Green)

HND PROJECT NUMBER: C03 PA 022900

OWNERSHIP STATUS:

Launch Area - Deeded to Upper Chicester Township School District of Delaware County

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

NIKE SITE LISTING FORM

STATE : Pennsylvania

DESCRIPTION NUMBER: PH 75/78

PROJECTION LOCATION: Edgemont (Media)

HND PROJECT NUMBER: CO3 PA 023000

OWNERSHIP STATUS:

Launch Area - DOD Control (USARC)

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : Pennsylvania

DESCRIPTION NUMBER: PH 82

PROJECTION LOCATION: Schuylkill Township

HND PROJECT NUMBER: CO3 PA 023100

OWNERSHIP STATUS:

University of Pennsylvania, Valley Forge Research Center

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

ORIGINAL (Red)

NIKE SITE LISTING FORM

STATE : Pennsylvania

DESCRIPTION NUMBER: PH 91

PROJECTION LOCATION: Worcester (Norristown)

HND PROJECT NUMBER: C03 PA 023200

OWNERSHIP STATUS:

Launch Area - DOD Control (Army)

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

STATE : Pennsylvania

DESCRIPTION NUMBER: PH 97/99

PROJECTION LOCATION: Warrington Township

HND PROJECT NUMBER: C03 PA 023300

OWNERSHIP STATUS:

Deeded to Warrington Township; Bucks County

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

ORIGINAL (Red)

NIKE SITE LISTING FORM

STATE : Rhode Island

DESCRIPTION NUMBER: PR 99

PROJECTION LOCATION: North Smithfield

HND PROJECT NUMBER: DO1 RI 002600 *

OWNERSHIP STATUS:

Launch Area - DOD Control

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

* Several sites in one report

STATE : Rhode Island

DESCRIPTION NUMBER: PR 38

PROJECTION LOCATION: Bristol

HND PROJECT NUMBER: DO1 RI 002600 *

OWNERSHIP STATUS:

Launch Area - Roger Williams College

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

* Several sites in one report
1980 USATHAMA report on Bristol

NIKE SITE LISTING FORM

STATE : Rhode Island

DESCRIPTION NUMBER: PR 58

PROJECTION LOCATION: Davisville (N. Kingston)

HND PROJECT NUMBER: D01 RI 002600 *

OWNERSHIP STATUS:

Launch Area - Rhode Island Port Authority

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

* Several sites in one report

STATE: Rhode Island

DESCRIPTION NUMBER: PR 69

PROJECTION LOCATION: Coventry

HND PROJECT NUMBER: D01 RI 001700

OWNERSHIP STATUS:

Launch Area - Deeded to municipality of Coventry

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

ORIGINAL (Red)

NIKE SITE LISTING FORM

STATE : Rhode Island

DESCRIPTION NUMBER: PR 79

PROJECTION LOCATION: Forster

HND PROJECT NUMBER: D01 RI 002600 *

OWNERSHIP STATUS:

Launch Area - Rhode Island State Police

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND

COMMENTS:

* Several sites in one report

NIKE SITE LISTING FORM

STATE : South Dakota

DESCRIPTION NUMBER: E 40

PROJECTION LOCATION: Ellsworth AFB

HND PROJECT NUMBER:

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: MRORE

COMMENTS:

STATE : South Dakota

DESCRIPTION NUMBER: E 20

PROJECTION LOCATION: Ellsworth AFB

HND PROJECT NUMBER:

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: MRORE

COMMENTS:

NIKE SITE LISTING FORM

STATE : South Dakota

DESCRIPTION NUMBER: E 40

PROJECTION LOCATION: Ellsworth AFB

HND PROJECT NUMBER:

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: MRORE

COMMENTS:

STATE : South Dakota

DESCRIPTION NUMBER: E 70

PROJECTION LOCATION: Ellsworth AFB

HND PROJECT NUMBER:

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: MRORE

COMMENTS:

ORIGINAL (Red)

NIKE SITE LISTING FORM

STATE : Texas

DESCRIPTION NUMBER: BG 40

PROJECTION LOCATION: Elroy

HND PROJECT NUMBER:

OWNERSHIP STATUS:

Several private citizens - Launch Area not identified - Probably Edmund W. Heiling or Richard R. Hooper

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SWFRE

COMMENTS:

STATE : Texas

DESCRIPTION NUMBER: BG 80

PROJECTION LOCATION: Austin (Travis County)

HND PROJECT NUMBER:

OWNERSHIP STATUS:

University of Texas - Texas National Guard - Launch Area not identifed

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SWFRE

COMMENTS:

NIKE SITE LISTING FORM

STATE : Texas

DESCRIPTION NUMBER: DFWDA

PROJECTION LOCATION: Duncanville

HND PROJECT NUMBER:

OWNERSHIP STATUS:

City of Duncanville - Site used for radar only

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SWFRE

COMMENTS:

STATE : Texas

DESCRIPTION NUMBER: DF 1

PROJECTION LOCATION: Denton (Sanger)

HND PROJECT NUMBER: K06 TX 026500

OWNERSHIP STATUS:

Denton Independent School District - North Texas State University - Launch Area not identified

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SWFRE

COMMENTS:

ORIGINAL (Red)

NIKE SITE LISTING FORM

STATE : Texas

DESCRIPTION NUMBER: DF 50

PROJECTION LOCATION: Alvarado

HND PROJECT NUMBER: K06 TX 026300

OWNERSHIP STATUS:

Fred Cowan - Gearhart Industries Inc. - Launch Area not identified

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SWFRE

COMMENTS:

STATE : Texas

DESCRIPTION NUMBER: DF 20

PROJECTION LOCATION: Terrell

HND PROJECT NUMBER: K06 TX 026400

OWNERSHIP STATUS:

Terrell Independent School District - Launch Area not identified

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SWFRE

COMMENTS:

NIKE SITE LISTING FORM

STATE : Texas

DESCRIPTION NUMBER: DY 10

PROJECTION LOCATION: Abilene

HND PROJECT NUMBER: K06 TX 017000

OWNERSHIP STATUS:

Several different school districts - Launch Area not identified

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SWFRE

COMMENTS:

STATE : Texas

DESCRIPTION NUMBER: DY 50

PROJECTION LOCATION: Abilene

HND PROJECT NUMBER: K06 TX 016900

OWNERSHIP STATUS:

Abilene Independent School District - Launch Area not identified

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SWFRE

COMMENTS:

ORIGINAL (Red)

NIKE SITE LISTING FORM

STATE : Texas

DESCRIPTION NUMBER: DF 70

PROJECTION LOCATION: Mineral Wells (Ft. Wolters)

HND PROJECT NUMBER:

OWNERSHIP STATUS:

Leased to Texas National Guard - Launch Area not identified

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: SWFRE

COMMENTS:

NIKE SITE LISTING FORM

STATE : Virginia

DESCRIPTION NUMBER: W 83

PROJECTION LOCATION: Herndon

HND PROJECT NUMBER: CO3 VA 016300

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

STATE : Virginia

DESCRIPTION NUMBER: W 65/65

PROJECTION LOCATION: Lorton

HND PROJECT NUMBER: CO3 VA 007500

OWNERSHIP STATUS:

District of Columbia

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: NAORE

COMMENTS:

Inspected by Norfolk

ORIGINAL (Red)

NIKE SITE LISTING FORM

STATE : Virginia

DESCRIPTION NUMBER: W 74

PROJECTION LOCATION: Fairfax County

HND PROJECT NUMBER: CO3 A 024900

OWNERSHIP STATUS:

Deeded to Fairfax County (Park Authority)

LOCATION OF AS-BUILT DRAWINGS:

Not available

SOURCE OF INFORMATION: HND NAORE

COMMENTS:

STATE : Virginia

DESCRIPTION NUMBER: N 36

PROJECTION LOCATION: Virginia Beach (Kempsville-Norfolk)

HND PROJECT NUMBER: CO3 VA 013100

OWNERSHIP STATUS:

Launch Area - Deeded to City of Virginia Beach - Virginia Beach Department of Parks and Recreation

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND NAORE

COMMENTS:

NIKE SITE LISTING FORM

STATE : Virginia

DESCRIPTION NUMBER: N 63

PROJECTION LOCATION: Driver (Suffolk)

HND PROJECT NUMBER: CO3 VA 003300

OWNERSHIP STATUS:

Deeded to City of Suffolk (Parks & Recreation Department)

LOCATION OF AS-BUILT DRAWINGS:

Original Buildings Demolished

SOURCE OF INFORMATION: HND NAORE

COMMENTS:

STATE : Virginia

DESCRIPTION NUMBER: Hampton (Norfolk)

PROJECTION LOCATION: N 93

HND PROJECT NUMBER: CO3 VA 013600

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: NAORE

COMMENTS:

ORIGINAL (Red)

NIKE SITE LISTING FORM

STATE : Virginia

DESCRIPTION NUMBER: N 02

PROJECTION LOCATION: Hampton (Newport News)

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: NAORE

COMMENTS:

STATE : Virginia

DESCRIPTION NUMBER: N 58

PROJECTION LOCATION: Chesapeake

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

NIKE SITE LISTING FORM

STATE : Virginia

DESCRIPTION NUMBER: N 75

PROJECTION LOCATION: Carrollton

HND PROJECT NUMBER: CO3 VA 000300

OWNERSHIP STATUS:

Deeded to County of Isle of Wight

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: HND NAORE

COMMENTS:

==========

STATE : Virginia

DESCRIPTION NUMBER: N 85

PROJECTION LOCATION: Newport News

HND PROJECT NUMBER: CO3 VA 013500

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: NAORE

COMMENTS:

Inspected by Norfolk

ORIGINAL (Red)

NIKE SITE LISTING FORM

STATE : Virginia

DESCRIPTION NUMBER: N 52

PROJECTION LOCATION: Norfolk (Chesapeake) (Deep Creek)

HND PROJECT NUMBER: CO3 A 013200

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

STATE : Virginia

DESCRIPTION NUMBER: N 25

PROJECTION LOCATION: Ft. Story

HND PROJECT NUMBER:

OWNERSHIP STATUS:

DOD Control

LOCATION OF AS-BUILT DRAWINGS:

Possibly at Ft. Story

SOURCE OF INFORMATION: NAORE

COMMENTS:

NIKE SITE LISTING FORM

STATE : Virginia

DESCRIPTION NUMBER: N 75

PROJECTION LOCATION: Smithfield

HND PROJECT NUMBER:

OWNERSHIP STATUS:

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION:

COMMENTS:

NIKE SITE LISTING FORM

STATE : Washington

DESCRIPTION NUMBER: F 07

PROJECTION LOCATION: Spokane (Fairchild)

END PROJECT NUMBER:

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

Some data available at COE District Office

SOURCE OF INFORMATION: NPSRE

COMMENTS:

STATE : Washington

DESCRIPTION NUMBER: F 37

PROJECTION LOCATION: Spokane (Fairchild)

END PROJECT NUMBER:

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

Some data available at COE District Office

SOURCE OF INFORMATION: NPSRE

COMMENTS:

NIKE SITE LISTING FORM

STATE : Washington

DESCRIPTION NUMBER: F 45

PROJECTION LOCATION: Spokane (Fairchild)

HND PROJECT NUMBER:

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

Some data available at COE District Office

SOURCE OF INFORMATION: NPSRE

COMMENTS:

STATE : Washington

DESCRIPTION NUMBER: F 87

PROJECTION LOCATION: Spokane (Fairchild)

HND PROJECT NUMBER:

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

Some data available at COE District Office

SOURCE OF INFORMATION: NPSRE

COMMENTS:

ORIGINAL (Red)

NIKE SITE LISTING FORM

STATE : Washington

DESCRIPTION NUMBER: S 03

PROJECTION LOCATION: Seattle (King and Snohomish Counties)

HND PROJECT NUMBER: F10 WA 009300

OWNERSHIP STATUS:

Launch Area - DOD Control - Permitted to the Federal Emergency Management Agency (FEMA)

LOCATION OF AS-BUILT DRAWINGS:

Some data available at COE District Office

SOURCE OF INFORMATION: HND SPSRE

COMMENTS:

STATE : Washington

DESCRIPTION NUMBER: S 13-14

PROJECTION LOCATION: Redmond

HND PROJECT NUMBER: F10 WA 009200

OWNERSHIP STATUS:

Launch Area - Lake Washington School District

LOCATION OF AS-BUILT DRAWINGS:

Some data available at COE District Office

SOURCE OF INFORMATION: HND NPSRE

COMMENTS:

NIKE SITE LISTING FORM

STATE : Washington

DESCRIPTION NUMBER: S 20

PROJECTION LOCATION: Cougar Moutain (King County)

HND PROJECT NUMBER: F10 WA 001301

OWNERSHIP STATUS:

Launch Area - Major portion jointly owned by the Issaquah School District and King County Parks Department

LOCATION OF AS-BUILT DRAWINGS:

Some data available at COE District Office

SOURCE OF INFORMATION: HND NPSRE

COMMENTS:

STATE : Washington

DESCRIPTION NUMBER: S 32-33

PROJECTION LOCATION: Youngs Lake (Renton)

HND PROJECT NUMBER: F10 WA 009000

OWNERSHIP STATUS:

Launch Area - South King County Activity Center

LOCATION OF AS-BUILT DRAWINGS:

Some data available at COE District Office

SOURCE OF INFORMATION: HND NPSRE

COMMENTS:

ORIGINAL (Red)

NIKE SITE LISTING FORM

STATE : Washington

DESCRIPTION NUMBER: S 43

PROJECTION LOCATION: Midway

HND PROJECT NUMBER:

OWNERSHIP STATUS:

Launch Area - Kent School District and King County Parks

LOCATION OF AS-BUILT DRAWINGS:

Some data available at COE District Office

SOURCE OF INFORMATION: NPSRE

COMMENTS:

STATE : Washington

DESCRIPTION NUMBER: S 61

PROJECTION LOCATION: Vashon Island

HND PROJECT NUMBER: F01 WA 009400

OWNERSHIP STATUS:

Launch Area - Deeded to King County

LOCATION OF AS-BUILT DRAWINGS:

Some data available at COE District Office

SOURCE OF INFORMATION: HND NPSRE

COMMENTS:

NIKE SITE LISTING FORM

STATE : Washington

DESCRIPTION NUMBER: S 62

PROJECTION LOCATION: Bremerton (Ollala)

HND PROJECT NUMBER: F10 WA 008900

OWNERSHIP STATUS:

Launch Area - Divided among multiple priate owners - Small portion retained by GSA

LOCATION OF AS-BUILT DRAWINGS:

Some data available at COE District Office

SOURCE OF INFORMATION: HND NPSRE

COMMENTS:

STATE : Washington

DESCRIPTION NUMBER: S 81

PROJECTION LOCATION: Paulsbo

HND PROJECT NUMBER:

OWNERSHIP STATUS:

Several private citizens, primarily Mr. Joseph P. Olhava

LOCATION OF AS-BUILT DRAWINGS:

Some data available at COE District Office

SOURCE OF INFORMATION: NPSRE

COMMENTS:

NIKE SITE LISTING FORM

STATE : Washington

DESCRIPTION NUMBER: N 82

PROJECTION LOCATION: Winslow

HND PROJECT NUMBER: F10 WA 008800

OWNERSHIP STATUS:

Launch Area - Portion deeded to Bainbridge Island Park and Recreation District - Portion released to fee owners - Portion retained by GSA

LOCATION OF AS-BUILT DRAWINGS:

Some data available at COE District Office

SOURCE OF INFORMATION: HND NPSRE

COMMENTS:

STATE : Washington

DESCRIPTION NUMBER: S 92

PROJECTION LOCATION: Kingston

HND PROJECT NUMBER: F10 WA 008700

OWNERSHIP STATUS:

Launch Area - Major portion deeded to North Kitsap School District - Remainder deeded to Kitsap County

LOCATION OF AS-BUILT DRAWINGS:

Some data available at COE District Office

SOURCE OF INFORMATION: HND

COMMENTS:

NIKE SITE LISTING FORM

STATE : Washington

DESCRIPTION NUMBER: H 06

PROJECTION LOCATION: Saddle Mountain (Camp Hanford)

HND PROJECT NUMBER:

OWNERSHIP STATUS:

Atomic Energy Commission

LOCATION OF AS-BUILT DRAWINGS:

Some data available at COE District Office

SOURCE OF INFORMATION: NPSRE

COMMENTS:

STATE : Washington

DESCRIPTION NUMBER: H 12

PROJECTION LOCATION: Othello (Camp Hanford)

HND PROJECT NUMBER:

OWNERSHIP STATUS:

Atomic Energy Commission

LOCATION OF AS-BUILT DRAWINGS:

Some data available at COE District Office

SOURCE OF INFORMATION: NPSRE

COMMENTS:

NIKE SITE LISTING FORM

STATE : Washington

DESCRIPTION NUMBER: H 52

PROJECTION LOCATION: Rattlesnake Mtn. (Camp Hanford)

HND PROJECT NUMBER:

OWNERSHIP STATUS:

Atomic Energy Commission

LOCATION OF AS-BUILT DRAWINGS:

Some data available at COE District Office

SOURCE OF INFORMATION: NPSRE

COMMENTS:

STATE : Washington

DESCRIPTION NUMBER: H 83

PROJECTION LOCATION: Priest Rapids (Camp Hanford)

HND PROJECT NUMBER:

OWNERSHIP STATUS:

Atomic Energy Commission

LOCATION OF AS-BUILT DRAWINGS:

Some data available at COE District Office

SOURCE OF INFORMATION: NPSRE

COMMENTS:

NIKE SITE LISTING FORM

STATE : Wisconsin

DESCRIPTION NUMBER: M 02

PROJECTION LOCATION: River Hills

HND PROJECT NUMBER: E05 WI 006701

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: MRORE

COMMENTS:

STATE : Wisconsin

DESCRIPTION NUMBER: M 20

PROJECTION LOCATION: Milwaukee

HND PROJECT NUMBER: E05 WI 006702

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: MRORE

COMMENTS:

NIKE SITE LISTING FORM

STATE : Wisconsin

DESCRIPTION NUMBER: M 42

PROJECTION LOCATION: Cudahy

HND PROJECT NUMBER: E05 WI 006703

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: MRORE

COMMENTS:

STATE : Wisconsin

DESCRIPTION NUMBER: M 54

PROJECTION LOCATION: Milwaukee

HND PROJECT NUMBER: E05 WI 006704

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: MRORE

COMMENTS:

NIKE SITE LISTING FORM

STATE : Wisconsin

DESCRIPTION NUMBER: M 64

PROJECTION LOCATION: Muskegon

HND PROJECT NUMBER: E05 WI 006705

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: MRORE

COMMENTS:

STATE : Wisconsin

DESCRIPTION NUMBER: M 74

PROJECTION LOCATION: Muskegon

HND PROJECT NUMBER: E05 WI 006706

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: MRORE

COMMENTS:

NIKE SITE LISTING FORM

STATE : Wisconsin

DESCRIPTION NUMBER: M 86

PROJECTION LOCATION: Menomonee Falls

HND PROJECT NUMBER: I 05 WI 006707

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: MRORE

COMMENTS:

STATE : Wisconsin

DESCRIPTION NUMBER: M 96

PROJECTION LOCATION: Milwaukee

HND PROJECT NUMBER:

OWNERSHIP STATUS:

No current information available

LOCATION OF AS-BUILT DRAWINGS:

SOURCE OF INFORMATION: MRORE

COMMENTS:

APPENDIX B

SITE DATA CORRESPONDENCE

ORIGINAL (Red)

EXAMPLE OF CORRESPONDENCE SENT TO ALL

CORPS OF ENGINEERS DISTRICT AND DIVISION OFFICES

REQUESTING NIKE SITE DATA

DEPARTMENT OF THE ARMY
HUNTSVILLE DIVISION, CORPS OF ENGINEERS
P.O. BOX 1600
HUNTSVILLE, ALABAMA 35807-4301

REPLY TO
ATTENTION OF

S: 3 September 1985

26 JUL 1985

HNDED-PM

SUBJECT: Request for Information on Former NIKE Sites

Commander
U.S. Army Engineer Division, Southwestern
ATTN: SWDRE/ Mr. M. B. Cottrell
1114 Commerce Street
Dallas, TX 75242

1. The Huntsville Division of the Corps of Engineers has entered into a contract with Law Environmental Services, a division of Law Engineering Testing Company. The project is entitled "Investigation of Former NIKE Missile Sites throughout CONUS for Potential Toxic and Hazardous Waste Contamination." The work required falls under the Defense Environmental Restoration Program (DERP).

2. To assist Law Environmental Services in their work effort, we request that you provide them with specific data as follows:

a. Real Estate data of the subject sites under your jurisdiction including ownership history and present ownership data regarding the individual sites. It is understood that in some cases, the ownership of the sites may be partial in that more than one owner has jurisdiction over various segments of the original site.

b. The best available data contained in your files regarding the location of "as-built" drawings relative to the original construction of the site.

c. The best available data from your files regarding any "deactivation plans" that may have existed as a result of the former shutdown of the site as a NIKE operation.

d. Designate any NIKE sites for which studies have been conducted or studies are anticipated in the near future relative to other programs that may deal with potential toxic and hazardous waste contamination.

HNDED-PM

SUBJECT: Request for Information on Former NIKE Sites

26 JUL 1985

3. Thank you for your assistance in this important study. Please communicate your findings directly to Law Environmental Services, Government Services Division, PO Box 888013, Atlanta, Georgia 30356-0013, ATTN: Dr. Harold T. Whitney, Jr. Since time is of the essence in this study, we request that you forward the results to Dr. Whitney by 3 September 1985.

FOR THE COMMANDER:

Jerry L Gregg

JERRY L. GREGG
LTC, MSC
Assistant Division Commander

CF:
Commander, U.S. Army Engineer District, Fort Worth, ATTN: SWFRE Mr. Jim Cain, PO Box 1730, Fort Worth, Texas 76102-0300
Commander, U.S. Army Engineer District, Albuquerque, ATTN: SWARE/Mr. Lloyd Gunther, Albuquerque, NM 87103
Ellis, PO Box 889, Savannah, GA 31402

Government Services Division
LAW ENVIRONMENTAL SERVICES
a division of law engineering testing company
1140 HAMMOND DRIVE, N.E. • SUITE 5150, BUILDING E
P.O. BOX 888013 • ATLANTA, GEORGIA 30356-0013 USA
(404) 396-8000 • TELEX 261320 LAWAT • CABLE: LAWENG

July 29, 1985

Commander
U.S. Army Engineer Division, North Atlantic
Attention: NADRE/Mr. W. Gordon
90 Church Street
New York, N. Y. 10007

Reference: Letter HNDED-PM, USACE, Huntsville Division
Dated July 26, 1985, Subject: Request for
Information on Former NIKE Sites

Gentlemen:

Please refer to the above referenced letter requesting your assistance in the study entitled "Investigation of Former NIKE Missile Sites Throughout CONUS for Potential Toxic and Hazardous Waste Contamination" which is described by contract between Law Environmental Services (LES), a division of Law Engineering Testing Company and the Huntsville Division, Corps of Engineers. Your assistance in gathering the requested data is necessary to permit a proper evaluation of potential NIKE sites that will undergo a field investigation for study of potential toxic and hazardous waste contamination.

According to preliminary data provided to LES, there are 65 NIKE sites within the jurisdiction of the New York District (NANRE), 36 NIKE sites within the jurisdiction of Baltimore District (NABRE), and 13 NIKE sites within the jurisdiction of the Norfolk District(NACRE).

LES will make telephone contact with your office and your district offices in August to ascertain the general nature of data available in your files, in an attempt to keep the Huntsville Division, Corps of Engineers current with progress of these studies. If you have any questions or comments, please contact me. Thank you for your cooperation in this very important study.

Very truly yours,

LES/GOVERNMENT SERVICES DIVISION

Harold T. Whitney, Jr.

Harold T. Whitney, Jr.
Project Manager

HTW/ac

cc: NANRE, NABRE and NACRE

ORIGINAL (Red)

TRANSMITTAL RESPONSES FROM

CORPS OF ENGINEERS DISTRICT AND DIVISION OFFICES

RECEIVED BY SEPTEMBER 30, 1985

ORIGINAL (Red)

NAORE-M

27 August 1985

SUBJECT: Request for Information on Former NIKE Sites

Commander, North Atlantic Division
ATTN: NADRE-M

1. Reference is made to your letter of 5 August 1985, subject as above.

2. Requested information for the above subject as stipulated in paragraph 2 of HNDED-PM letter dated 26 July 1985 is shown on the attached enclosure.

3. If additional information is required concerning the subject sites contact this office on FTS 827-3735 or AV 680-9735.

L. E. Rice, Jr.
Chief, Real Division

Enclosure

CF: Real Estate
Reading

AUG 1985
DISPATCHED
Norfolk District, CE
Norfolk, Virginia

C1677

WANG 4074F

HEWITT/mi
HORTON
RICE

ONE TIME REPORTS

DEPARTMENT OF THE ARMY
NORFOLK DISTRICT, CORPS OF ENGINEERS
NIKE SITE REPORT

ORIGINAL (Red)

1.a. Installation - NIKE Battery 02
Newport News, Virginia

b. Ownership Data - Government acquisition of 312.25 acres of land by means of purchase, deed and declartions of taking from 1955 to 1969 with said acquisitions being approximately 62.57 acres fee, containing 4 tracts of land, and 249.68 acres lesser interests containing 69 tracts of land. Approximately 55.73 acres fee and 249.68 acres in lesser interests were reported to GSA as excess real property on April 25, 1966 and GSA subsequently conveyed 55.73 acres fee and 3.78 acres lesser interest (easements) to the City of Hampton, Virginia by Quit Claim Deed dated Fedruary 13, 1967. Easement acres totaling approximately 74.96 acres were conveyed by release of easement deed and GSA accepted accountability for the remaining 170.94 acres lesser interests as of May 31, 1967. The U.S. Army Recruiting Commard was reassigned the remaining 6.84 acres fee as of May 31, 1967.

c. Construction Plans - N/A

d. Deactivation Plans - N/A

e. Contamination Studies - None to date

2.a. Installation - NIKE Battery 25
Fort Story, Virginia

b. Ownership Data - Approximately 8.90 acres of fee-owned land being a part of the Fort Story Military Reservation, Virginia.

c. Construction Plans - location of plans/drawings are unknown contract Facilities Engineer at Fort Story for additional information.

d. Deactivation Plans - NIKE Battery 25 was officially closed as of 1976 and the facility is currently being utilized for military training.

e. Contamination Studies - none

3.a. Installation - NIKE Battery 36
Virginia Beach, Virginia

b. Ownership Data - Government acquistion of 223.01 acres of land by means of declarations of taking from 1957 to 1959 with said acquistions being approximately 21.46 acres fee, containing 2 tracts of land, and 201.55 acres lesser interests, containing 31 tracts of land. The facility was reported s excess real property to GSA on September 23, 1965 and GSA subsequently

conveyed 21.46 acres fee and 7.38 acres easement to the City of Virginia Beach, Virginia by Quit Claim Deed, dated February 27, 1967, for public park and recreation purposes. Approximately 162.34 acres easements were conveyed by release of easement deed and GSA accepted accountability for 31.83 acres.

c. Construction Plans - N/A

d. Deactivation Plans - N/A

e. Contamination Studies Studies - DERP - a preliminary site inspection was conducted by the Norfolk District and further tests and studies, including soil testing, were recommended to detect any toxic or hazardous contamination.

4.a. Installation - NIKE Battery 52
Chesapeake, Virginia

b. Ownership Data - Government acquisition of 64.46 acres of land by means of purchase, deed, and declarations of taking from 1956 to 1962 with said acquisitions being approximately 29.36 acres fee, containing 5 tracts of land, and 35.10 acres lesser interest, containing 14 tracts of land. Facility was reported as excess real property to GSA on September 16, 1974 and GSA subsequently conveyed 11.47 acres fee and 2.09 acres easement to the Chesapeake City Public Schools by Quit Claim Deed, dated January 29, 1976; 12.36 acres fee was conveyed to the City of Chesapeake by Quit Claim Deed, dated March 15, 1976; 5.53 acres fee was transferred to the Department of the Navy for Navy Family Housing on December 19, 1974. GSA accepted accountability for the remaining 33.01 acres easements as of July 15, 1976 and approximately 0.51 acre easement was reserved by the Government for an 8-inch waterline.

c. Construction Plans - N/A

d. Deactivation Plans - N/A

e. Contamination Studies - None

5.a. Installation - NIKE Battery 63
Nansemond County (Suffolk), Virginia

b. Ownership Data - Government acquisition of 350.91 acres of Land by declarations of taking from 1956 to 1962 with said acquisitions being approximately 80.95 acres fee, containing 2 tracts of land, and 269.96 acres lesser interests, containing 35 tracts of land. Approximately 71.00 acres fee and 268.09 acres easements were reported as excess real property to GSA on May 26, 1966; by Quit Claim Deed, dated June 30, 1967, H.E.W. conveyed to the Nansemond County School Board approximately 20.00 acres fee and 5.55 acres easement; approximately 51.00 acres fee were conveyed by GSA to Nansemond

County by Quit Claim Deed dated September 13, 1967, and GSA accepted accountability for approximately 262.54 acres easements as of October 26, 1967. The U.S. Army Reserve was reassigned approximately 9.95 acres fee and 1.87 acres easements as of October 26, 1967.

c. Contruction Plans - Original buildings and structures were demolished and a new U.S. Army Reserve Center was constructed on the site.

d. Deactivation Plans - N/A

e. Contamination Studies - None

Note: Nansemond County has been incorporated into the City of Suffolk, Virginia.

6.a. Installation - NIKE Battery 75
Carrollton, Virginia
(Isle of Wight County)

b. Ownership Data - Government acquisition of 316.83 acres of land by declarations of taking from 1954 to 1958 with said acquisitions being approximately 54.87 acres fee, containing 3 tracts of land, and 261.96 acres lesser interests, of which 1.74 acres were for permanent easement and right of way to the site and 0.58 acre for a perpetual easement for communication cables. The NIKE Battery was deactivated on June 30, 1961 and the installation was designated as a U.S. CONARC Radio Site as of September 7, 1961. The Government acquired approximately 110 acres fee by purchase on December 18, 1961 to facilitate radio antenna construction with approximately 3.03 acres of the acquisition being easement interests previously acquired by declaration of taking in 1954. The CONARC Radio Site was reported to GSA as excess real property on October 29, 1971 with the exception of approximately 3.99 acres fee (Capehart Housing). Approximately 160.88 acres in fee were conveyed to Isle of Wight County by Quit Claim Deed, dated July 11, 1973, by the Department of the Interior, Bureau of Outdoor Recreation for public park and recreation purposes; by release of easement deed approximately 30.05 acres were conveyed by GSA on January 11, 1973, the 3.99 acres fee (Capehart Housing) was conveyed by GSA to Mr. Robert L. Magette by Quit Claim Deed dated September 21, 1978 and GSA accepted accountability for the remaining 228.88 acres easements.

c. Construction Plans - N/A

d. Deactivation Plans - NIKE Battery 75 was deactivated on June 30, 1961 and assigned to Fort Monroe, Virginia. The installation was designated as U.S. CONARC Radio Site No. 4875 on September 7, 1961 and until final excessing by the Government remained under Department of Defense Control.

e. Contamination Studies - Carrollton NIKE Park (NIKE Battery 75) was inspected by the Norfolk District under the DERP program and an Environmental Restoration Defense Account (ERDA) Site Survey Report was prepared (Project No. C03 VA 000300) as of August 20, 1984.

7.a. Installation - NIKE Battery 85
Newport News, Virginia

b. Ownership Data - Government acquisition of 571.96 acres of land of which 17.51 fee were reassigned from the former Camp Patrick Henry on April 11, 1962; 330.33 acres were leased from the Peninsula Airport Commission on June 30, 1965 and 224.12 acres easements were acquired by declaration of taking from 15 owners as of February 2, 1955. Approximately 6.625 acres fee were reported as excess real property to GSA on December 19, 1972 and GSA subsequently conveyed the property to the Peninsula Airport Commission by Quit Claim Deed dated December 20, 1973; approximately 330.33 acres-leased were returned to the lessor, Peninsula Airport Commission, by modification No. 2 which terminated lease No. DA-49-080-ENG-2350 on May 15, 1975; 224.12 acres easement were reported to GSA on November 13, 1974 and GSA accepted accountability of the property on March 23, 1976; approximately 10.88 acres fee was retained for family housing for personnel assigned to Fort Eustis, Virginia.

c. Construction Plans - N/A

d. Deactivation Plans - N/A

e. Contamination Studies - NIKE Battery 85 was inspected by the Norfolk District under the DERP program and assigned Project No. C03VA009500. The only proposed work on the site to be performed by the Department of Defense was soil testing to establish the presence or abscence of toxic or other soil contaminates.

8.a. Installation - NIKE Battery 93
Hampton, Virginia

b. Ownership Data - Government acquisition of 170.75 acres of land by declarations of taking from 1956 to 1963 with said acquisitions being approximately 20.78 acres fee, containing 4 tracts of land, and 149.97 acres lesser interests, containing 50 tracts of land. Approximately 144.47 acres easements were reported to GSA as excess property on June 10, 1966 and GSA subsequently conveyed 104.88 acres by release of easement deed and accepted accountability for the remaining 39.59 acres as of October 10, 1967. The U.S. Army Reserves were reassigned approximately 20.78 acres fee and 5.50 acres easements of October 10, 1967.

c. Construction Plans - N/A

d. Deactivation Plans - N/A

e. Contamination Studies - none

NOTE: The Government reserved reverter rights for all the above mentioned property in the event of a national ememergency.

9.a. Installation - NIKE Battery 74
Fairfax Station Nike Site
Fairfax, Virginia

b. Ownership Data -
Governemnt acquired 15.0 acres in fee and 2.08 acres in easement in 1954 for the launch control site. By Quitclaim deed dated May 19, 1975, the Government conveyed 15.01 acres in fee simple and 2.08 acres in easement to the County of Fairfax, Virginia. The conveyance was made by the Department of the Interior with the stipulation that the land be used exclusively for public park or public recreation purposes in perpetuity. The Government reserved all oil, gas, and other mineral rights in, under, and upon the lands conveyed.

c. Construction Plans - N/A

d. Deactivation Plans - N/A

e. Contamination Studies - Nike Battery 74 was inspected by the Norfolk District under the DERP program and assigned Project Number 003VA007502. The proposed work on the site to be performed by the Department of the Defense includes the removal of buildings and grading the entire area of the site assuring a two foot soil cover.

10.a. Installation - NIKE Battery 64/65
Lorton, Virginia

b. Ownership Data - Government acquired use of property by a permit dated October 6, 1953 from the District of Columbia. The site encompassed 30 acres for exclusive use and 92.7 acres of joint use. The permit was terminated on October 7, 1974. The District of Columbia has control of this property and a new 400 man minimum security facility is being built on a portion of this site.

c. Construction Plans - N/A

d. Deactivation Plans - Restoration of site was performed by the Government at the time of termination of permit.

e. Contamination Studies - DERP - a site inspection was conducted by the Norfolk District and assigned Project Number 003VA007501. It was determined that no further responsibility for environmental restoration rested with the Department of Defense.

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 1715
BALTIMORE, MARYLAND 21203-1715

NABRE-M

22 August 1985

SUBJECT: Request for Information on Former NIKE Sites

Commander, North Atlantic Division
ATTN: NADRE-M

1. Reference:

a. NADRE-M, multiple letter dated 5 Aug 85, SAB.

b. HNDED-PM, letter dated 26 July 85, SAB, enclsoure to reference (a).

2. IAW Paragraph 2 of above reference 1(b), enclosed are 30 Defense Environmental Restoration Program (DERP) Real Estate Data Reports. At the present time there are no "as built" drawings or "deactivation plans" for the NIKE sites. To assist the Law Environmental Services, enclosed are Real Estate maps for the majority of the NIKE sites.

3. There are 3 NIKE sites without DERP Real Estate Data Reports. The Baltimore District, Engineering Division Project Manager, disqualified 3 NIKE sites listed below and therefore DERP Real Estate Data Reports do not exist.

PI-92	Pittsburgh, Pennsylvania
PI-93	Westview, Pennsylvania
W-94	Rockville, Maryland

Have these reports

4. IAW request by Huntsville Division, Baltimore's Real Estate Division obtained DERP, Right-of-Entry for survey and exploration for 7 NIKE sites listed below. These sites should have test borings and ground samplings performed before the end of the year. Real Estate Data Report for NIKE BA-03, Phoenix, Maryland, has a History of Contamination Report attached which USATHAMA provided, but it is the only contamination report available at the present time.

BA-03	Phoenix, Maryland
BA-09	Fork, Maryland
BA-30/31	Chestertown, Maryland
BA-92	Greenspring, Maryland
PH-07	Newton, Pennsylvania

NAERE-M

SUBJECT: Request for Information on Former NIKE Sites

PI-71	Coraopolis, Pennsylvania
W-35	Upper Marlboro, Maryland

FOR THE COMMANDER:

Encls

Dominick J. Sijoi
for G. R. BOGGS
Chief, Real Estate Division

NANRE-M (5 Aug 85) 1st End
SUBJECT: Request for Information of Former Nike Sites

DA, New York District, Corps of Engineers, 26 Federal Plaza, New York, NY 10278-0090 2 6 AUG 1985

TO: Commander, North Atlantic Division, ATTN: NADRE-M

1. Reference is made to Paragraph 4 of basic letter concerning the request of the Law Environmental Services, a contractor of the Huntsville Division, for real estate data in connection with the project entitled "Investigation of Former Nike Missile Sites through CONUS for Potential Toxic and Hazardous Waste Contamination".

2. The following list of Nike Sites have been investigated and written reports containing Real Estate data have been furnished to and are available at the Huntsville Division:

State of New Jersey:

NY80, PH58, NY60, NY65, NY54, PH41/43, NY93, PH32, NY73, NY88, PH23/25 and PA49.

State of New York:

NY05, NY25, NY99, NY20, NY24, NY09, NY23, BU09, NF03, NF16, BU18, BU34/35, NB41 and BU51/52.

State of Connecticut:

BR04, BR17, BR65, BR73, BR94, BU15, HA08, HA25, HA36, HA48, HA67 and HA85.

State of Rhode Island:

PR99, PR69 and Tactical Support Site Facility.

State of Massachusetts:

B03, B05, B017, B036, B038, B063, B073, B084, B085, B019 and B029.

State of Maine:

L031, L058 and Tactical Support Site Facility.

3. Written reports on Fort Hancock, New Jersey and Fort Tilden, New York have also been forwarded to the Huntsville Division.

27

2 6 AUG 1985

NANRE-M (5 Aug 85) 1st End
SUBJECT: Request for Information of Former Nike Sites

4. This District has been advised by the New England Division that reports on the following Nike Batteries HAVE NOT been submitted to Huntsville Division although we understand that New England Division is in the process of preparing reports on these sites:

Tactical Support Site Facility, Milford, CT
PR38, Bristol, RI
PR58, North Kingston, RI
PR79, Foster, RI
BO40/HQ, Quincy, MA
BO15, Beverly, MA
BO37, Boston Harbor, MA
LO13, Caswell, ME
LO85, Connor, ME

5. Research of this District's Historical File on Fort Slocum (Installation #347) did not indicate that a Nike Battery was ever constructed at this site. A review of the Excess Report did not reveal any Control or Launcher Facilities or any other ancillary buildings nor does the Real Estate Project Map indicate the existence of a Nike Battery at Fort Slocum.

6. Real Estate Project Maps for all the Nike Batteries in New York, New Jersey, Connecticut, Rhode Island, Massachusetts and Maine are available for direct mailing to Law Environmental Services by this District.

7. Although we have not thus far obtained "as built" drawings we are continuing our efforts to procure same which may possibly be obtainable on microfilm. Additional time is required to ascertain if such drawings are available.

8. There are no deactivation plans in our historical files.

FOR THE COMMANDER:

John J Bastible

JOHN J. BASTIBLE
Chief, Real Estate Division

Encl
nc

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
26 FEDERAL PLAZA
NEW YORK, N. Y. 10278-0090

AUG 27 1985

REPLY TO
ATTENTION OF:

Management and Disposal Branch

Dr. Harold T. Whitney, Jr
Project Manager
Law Environmental Services
1140 Hammond Drive, NE
Suite 5150
Building E
P.O. Box 888013
Atlanta, Georgia 30356-0013

Dear Dr. Whitney:

Enclosed are Real Estate Project Maps for the sixty-five (65) Nike Batteries located in New York, New Jersey, Connecticut, Rhode Island, Massachusetts and Maine.

Sincerely,

for John J. Bastible
Chief, Real Estate Division

DEPARTMENT OF THE ARMY
NORTH ATLANTIC DIVISION, CORPS OF ENGINEERS
90 CHURCH STREET
NEW YORK, N. Y. 10007

September 10, 1985

IN REPLY REFER TO
Real Estate Division
Management and Disposal Branch

Harold T. Whitney, Jr.
Project Manager
Law Environmental Services
Government Services Division
P.O. Box 888013
Atlanta, GA 30356-0013

Dear Dr. Whitney:

The information requested in your recent letter concerning ownership data and studies conducted at former NIKE sites for our Baltimore and New York Districts is enclosed. Norfolk District has mailed the information directly.

No "as-built" drawings or deactivation plans have yet been located for the former NIKE sites; however, Real Estate project maps have been mailed under separate cover.

If we can be of further assistance, please feel free to contact James A. Eddis at (212) 264-7642.

Sincerely,

Warren Gordon

Warren Gordon
Chief, Real Estate Division

DEPARTMENT OF THE ARMY
SAVANNAH DISTRICT, CORPS OF ENGINEERS
P.O. BOX 889
SAVANNAH, GEORGIA 31402-0889

September 5, 1985

REPLY TO
ATTENTION OF:

Real Estate Division

Mr. Harold T. Whitney, Jr.
Law Engineering Testing Company
P. O. Box 888013
Atlanta, Georgia 30356-0013

Dear Mr. Whitney:

Enclosed is information you requested regarding four deactivated Nike missile sites in Georgia. The four sites are Robbins AFB Nike Battery #28, Turner AFB Nike Battery #79, Turner AFB Nike Battery #28, and Robbins AFB Nike Battery #88.

Ownership history information is provided in the attached enclosures.

As-built drawings of the four sites are maintained on microfilm at Savannah District, U.S. Army Corps of Engineers. Any formal deactivation plans which may have been prepared for any of the sites are not contained in the records maintained by Savannah District.

Please let me know if I can be of further assistance.

Sincerely,

James B. Simpson
Realty Specialist
Management & Disposal Branch
Real Estate Division

Enclosures

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

September 9, 1985

REPLY TO
ATTENTION OF
Real Estate Division

Mr. Harold Whitney
Law Environmental Services
Government Services Division
Post Office Box 888013
Atlanta, Georgia 30346-0013

Dear Mr. Whitney:

Enclosed is information requested on the fourteen former Nike sites located in Florida.

SITE	OWNER
HM-01	Headquarters U.S. Air Force ATTN: LEER Washington, DC 20320
HM-03	Department of Navy Southern Division Naval Facilities Engineering Command Charleston, SC 29411
HM-12	Harvey Rudich 1502 Northeast 105th St. Miami Shores, FL 33138 Tel: (305) 895-1271 (305) 253-7742
HM-39	Curtis G. Poland Post Office Box 1393 Homestead, FL 33030 Tel: (305) 523-2910 Ext. 245
HM-40	Department of Navy Southern Division Naval Facilities Engineering Command Charleston, SC 29411

SITE	OWNER
HM-59	State of Florida Florida Department of Corrections ATTN: Ana Gisperts Florida City, FL (305) 245-3350
HM-69	John M. Morehead, Superintendent Everglades National Park P.O. Box 279 Homestead, FL 33030
HM-84	Harvey Rudich 1502 Northeast 105th St. Miami Shores, FL 33138 Tel: (305) 895-1271 (305) 253-7742
HM-95	Permitted to DOD Communications Activity
KW-10	Department of Navy Southern Division Naval Facilities Engineering Command Charleston, SC 29411
KW-24	Department of Navy Naval Facilities Engineering Command (Southern Division) Charleston, SC 29411
KW-65	Department of Navy Southern Division Naval Facilities Engineering Command Charleston, SC 29411
KW-80	U.S. Army Special Forces
KW-95	Department of Navy Southern Division Naval Facilities Engineering Command Charleston, SC 29411

HM-69 is a funded DERP project and reports are being prepared on HM-12, HM-39, HM-59, and HM-84. There are also available as-built drawings for HM-12, HM-84 and HM-69.

For further assistance please contact C.R. Baker (904) 791-2483.

Sincerely,

Robert R. Stafford

for Walter P. Jones III
Chief, Real Estate Division

Enclosure

SPDER-M 11 September 1985

SUBJECT: Request for Information Former NIKE Sites

Commander
US Army Engineer Division, Huntsville
ATTN: HNDED-FM/Captain Miller
P. O. Box 1600
Huntsville, Alabama 35807

1. References:

a. Letter, HNDED-FM, dated 26 July 1985, with suspense date of 3 September 1985, subject as above (encl 1).

b. Message, HNDED-FM 061300Z Sept 1985, with revised suspense date of 10 September 1985, subject as above (encl 2).

2. Reference a requested the South Pacific Division provide assistance to the contract firm of Law Engineering Testing Company by providing specific data on 34 former NIKE sites within the boundaries of this Division.

3. Reference b. requested the information as requested in reference a be sent to HNDED-FM and the contractor by 10 September 1985 and to contact Captain Miller if this revised suspense date could not be met. Captain Miller was advised that due to resource constraints, SPD could not meet this date.

4. Enclosed is the data from the Sacramento District with the exception of current ownership data. The District has advised this information will be forwarded when compiled from the various counties in which the sites are located. Also enclosed is a listing of the "as-built" drawings that have been sent to the GSA office in San Francisco. The files did not disclose information as to deactivation plans or that studies for toxic and hazardous wastes were conducted (encl 3).

SPDER-M 11 September 1985
SUBJECT: Request for Information Former NIKE Sites

5. The Los Angeles District has submitted data for two sites and advised that due to resource constraints, data on the remaining sites should be forwarded by 30 September 1985. From information received, the following sites have been, or will be, the subject of a toxic and hazardous waste contamination program: LA-04, LA-09, LA-43, LA-55, LA-78, LA-94 and LA-98.

FOR THE COMMANDER:

Encls - sent to
LES/Government Services Division

RICHARD G. PENNETT
Acting Chief, Real Estate Division

CF (w/3 encls):
LES/Government Services Division
1140 Hammond Drive, N.E.
Suite 5150, Building E
P.O. Box 888013
Atlanta, Georgia 30356

SPD RF

DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
650 CAPITOL MALL
SACRAMENTO, CALIFORNIA 95814

REPLY TO
ATTENTION OF

SPKRE-M

23 August 1985

SUBJECT: Request for Information on Former NIKE Sites

Commander, South Pacific Division, ATTN: SPDRE-M

1. Enclosed is a list of Real Estate data on the requested 17 NIKE sites. We have no information on San Francisco Defense Areas - NIKE Batteries 87 and 88. It can only be assumed that the NIKE sites were included in Forts Barry and Cronkhite and are now owned by the Golden Gate National Recreation Area. We have lost the file for Travis Air Force Base - NIKE Battery T 53, but have inclosed the Real Estate map which shows how the property was acquired and disposed of.

2. Also enclosed are all the Real Estate maps and information from our Engineering Division regarding paragraphs 2. b, c, and d. of letter HNDED-PM, dated 26 Jul 1985, same subject.

3. We have been unable to locate any information on present owners of the NIKE sites. Additional time would have to be allowed to research the assessor's records because we have no parcel numbers or street addresses.

FOR THE COMMANDER:

Enclosures

MORGAN WHEELER
Chief, Real Estate Division

FNCL 3

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX C-3755
SEATTLE, WASHINGTON 98124-2255

REPLY TO ATTENTION OF
Planning Branch

12 SEP 1985

Mr. Harold T. Whitney, Jr.
Government Services Division
Law Environmental Services
Post Office Box 88013
Atlanta, Georgia 30356-0013

Dear Mr. Whitney:

This is in reply to your July 19, 1985, letter requesting assistance in conducting investigations of 20 former Nike Missile sites in Seattle District.

As we discussed on September 5, data available on those sites which we have not conducted site survey investigations ends when the Government disposed of the property. Investigation into current ownership has been initiated but may not be completed until 1 November 1985. Following is a summary of information on the requested Nike sites. We are not aware of any "deactivization plan" for any of the Nike sites.

a. Cougar Mountain Nike Site. Battery No. 20. Site Survey Report is completed (you have a copy). Some as-built data is available in our District files.

b. Vashon Island Nike Site. Battery No. 61. Site Survey Report is completed (you have a copy). Some as-built data is available in our District files.

c. North Seattle Nike Site. Nike Battery No. 03. Site Survey Report is completed (you have a copy). Some as-built data is available in our District files.

d. Redmond Nike Site. Battery Nos. 13-14. Site Survey Report is completed (you have a copy). Some as-built data is available in our District files.

e. Youngs Lake Nike Site. Battery Nos. 32-33. Site Survey Report is completed (you have a copy). Some as-built data is available in our District files.

f. Ollala Nike Site. Battery No. 62. Site Survey Report is completed (you have a copy). Some as-built data is available in our District files.

g. Kingston Nike Site. Battery No. 92. Site Survey Report is completed (you have a copy). Some as-built data is available in our District files.

h. Winslow Nike Site. Battery No. 82. Site Survey Report is completed (you have a copy). Some as-built data is available in our District files.

i. Midway Nike Site. Battery No. 43. Site Survey Report dated June 13, 1985, is enclosed (enclosure 1). Some as-built data is available in our District files.

j. Poulsbo Nike Site. Battery No. 81. Site Survey Report dated August 16, 1985, is enclosed (enclosure 2). Some as-built data is available in our District files.

k. Camp Handford consists of four Nike Sites. Enclosure 3 is a breakdown of disposition of real estate as reflected in our District records. Some as-built data is available in our District files, however, most as-built data would have to be received from the current user.

l. Fairchild Nike Site. Battery No. 07. Enclosure 4 is a breakdown of disposition of real estate as reflected in our District records. Some as-built data is available in our District files, however, most as-built data would have to be received from the current user.

m. Fairchild Nike Site. Battery No. 37. Enclosure 5 is a breakdown of disposition of real estate as reflected in our District records. Some as-built data is available in our District files, however, most as-built data would have to be received from the current user.

n. Fairchild Nike Site. Battery No. 45. Enclosure 6 is a breakdown of disposition of real estate as reflected in our District records. Some as-built data is available in our District files, however, most as-built data would have to be received from the current user.

o. Fairchild Nike Site. Battery No. 87. Enclosure 7 is a breakdown of disposition of real estate as reflected in our District records. Some as-built data is available in our District files, however, most as-built data would have to be received from the current user.

p. Mountain Home Nike Site. Battery No. 05. Enclosure 8 is a breakdown of disposition of real estate as reflected in our District records. Some as-built data is available in our District files, however, most as-built data would have to be received from the current user.

q. Mountain Home Nike Site. Battery No. MH-79. Enclosure 9 is a breakdown of disposition of real estate as reflected in our District records. Some as-built data is available in our District files, however, most as-built data would have to be received from the current user.

If you have any questions, or wish clarification on any of the above items, please contact me at (206) 764-3699.

Sincerely,

Lester E. Soule

Lester E. Soule
Project Manager

Enclosures

RTMENT OF THE ARMY
'I DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
ORTH, TEXAS 76102

FT. WORTH

SWFRE-MD

3 September 1985

SUBJECT: Request for Information on Former NIKE Sites

Commander
U.S. Army Engineer Division, Huntsville
ATTN: HNDED-PM
P.O. Box 1600
Huntsville, AL 35807-4301

1. Reference letter HNDED-PM, 26 Jul 85, subject as above.

2. Ownership history and present ownership data for NIKE sites within Texas are being gathered. Real estate records on the sites are not readily available. Limited real estate data on sites can be furnished on piecemeal basis; however, we propose to submit all real estate data at one time. Requested information, as available, will be furnished on or before 4 Oct 85. Information will be furnished directly to Law Environmental Services.

FOR THE COMMANDER:

JAMES P. CAIN
Chief, Real Estate Division

CF:
Cdr, Southwestern Division, ATTN: SWDRE-M
Mr. Harold T. Whitney, Jr., Government Services Division,
Law Environmental Services, P.O. Box 888013,
Atlanta, GA 30356-0013 with copy of letter HNDED-PM dated 26 July 1985

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

REPLY TO ATTENTION OF:

September 25, 1985

Real Estate Division

SUBJECT: Request for Information on Former NIKE Sites

Dr. Harold T. Whitney, Jr.
Law Environmental Services
Government Services Division
Post Office Box 888013
Atlanta, Georgia 30356-0013

Dear Dr. Whitney:

Enclosed is the requested data, as available, on nine former NIKE sites under our jurisdiction. Also included are two sites at Barksdale Air Force Base, BD-10 and BD-50, that are under the jurisdiction of the New Orleans District.

Additional information on sites in Louisiana should be obtained from New Orleans District, Corps of Engineers, ATTENTION: LMNRE-M, Post Office Box 60267, New Orleans, Louisiana 70160-0267.

Sincerely,

James P. Cain

James P. Cain
Chief, Real Estate Division

Enclosures

DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1580
ALBUQUERQUE, NEW MEXICO 87103-1580

REPLY TO
ATTENTION OF:

August 28, 1985

Real Estate Division
Support Branch

Dr. Harold T. Whitney, Jr.
Law Environmental Services
Government Services Division
P. O. Box 888013
Atlanta, Georgia 30356-0013

Dear Dr. Whitney:

In regard to the project "Investigation of Former NIKE Missile Sites throughout CONUS for Potential Toxic and Hazardous Waste Contamination", we would like to inform you that the Albuquerque District has no former NIKE missile sites within its area of responsibility.

Sincerely,

L. A. Guenther

L. A. Guenther
Chief, Real Estate Division

DEPARTMENT OF THE ARMY
OHIO RIVER DIVISION, CORPS OF ENGINEERS
P. O. BOX 1159
CINCINNATI, OHIO 45201-1159

REPLY TO ATTENTION OF
ORDRE-A

21 August 1985

SUBJECT: DERP, Request for Information on Former NIKE Sites

Commander, Louisville District
ATTN: ORLRE

1. References:

a. Letter, HNDED-PM, 26 July 1985, subject: Request for Information on Former NIKE Sites, copy enclosed.

b. Letter, Harold T. Whitney, Jr., Law Environmental Service, 29 July 1985.

2. As discussed by telephone conversation, 20 September 1985, between Messrs. Mike Davis, this office, and Wilkinson and Link, ORLRE, the request for information should be coordinated with ORLED and the reply made directly to Law Environmental Services.

FOR THE COMMANDER:

Encl

KENNETH L. HIRSHEY
Chief, Real Estate Division

CF:
ORDED-M

Commander
U.S. Army Engineer Division, Huntsville
ATTN: HNDED-PM
P.O. Box 1600
Huntsville, AL 35807-4301

Mr. Harold G. Whitney, Jr.
Project Manager
Law Environmental Services
P.O. Box 888013
Atlanta, GA 30356-0013

DEPARTMENT OF THE ARMY
LOUISVILLE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 59
LOUISVILLE, KENTUCKY 40201-0059

September 5, 1985

ORLRE-AP

Law Environmental Services
Government Services Division
ATTN: Dr. Harold T. Whitney, Jr.
P. O. Box 888013
Atlanta, Georgia 30356-0013

Dear Dr. Whitney:

This office received your letter dated July 29, 1985, requesting data on former Nike Missile Sites within the jurisdiction of the Louisville District.

According to our records, there are no plans or reports regarding any deactivation plans existing as a result of the former shutdown of any Nike sites.

There are no available files regarding "as-built" drawings relative to the original construction of the sites.

Enclosed is a real estate history of subject sites according to real estate records available in our office. County deed records have not been searched for current ownership due to the heavy volume of research involved.

To the best of our knowledge there are no other programs anticipated in the near future that deal with potential toxic and hazardous waste contamination outside of the Defense Environmental Restoration Program.

Sincerely,

L. R. Lehl

for Wendell W. Wilkinson
Chief, Real Estate Division

Enclosures

DEPARTMENT OF THE ARMY
LOUISVILLE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 59
LOUISVILLE, KENTUCKY 40201-0059

September 23, 1985

ORLRE-AP

Law Environmental Services
Government Services Division
Attn: Dr. Harold T. Whitney, Jr.
P. O. Box 888013
Atlanta, Georgia 30356-0013

Dear Dr. Whitney:

Enclosed is additional information on Nike Sites 70, Naperville, Illinois, and 47, Hobart, Indiana. This list of current owners supplements the data previously furnished your office.

A copy of this letter is being forwarded to Huntsville Division and Ohio River Division, Corps of Engineers.

I trust this information will be helpful.

Sincerely,

for Wendell W. Wilkinson
Chief, Real Estate Division

Enclosure

Nike Site No. 47 Hobart, Indiana 34.62 Acres (Fee)

Launcher Area

Tract A 100	12.94 Acres
A 101	.37 Acres
A 106	.85 Acres
Total	14.16 Acres

Current Owner: Portage Township School Corporation
5894 Central Avenue
Portage, Indiana 46368

Control Area

Tract A 103 20.46 Acres

Current Owner: Dale L. and Donna B. Summer
600 E. 70th Place
Maryville, Indiana 46140

Nike Site No. 70 Naperville, Illinois 61.11 Acres (Fee)

Control Area

Tract A 102	9.62 Acres
A 103	4.21 Acres
Total	13.83 Acres

Current Owner: AMOCO Oil Corporation
P. O. Box 3428
Oakbrook, Illinois 60522

Launcher Area

Tract A 100 47.28 Acres

Current Owners:	Barofsky, Passon, Strombeck, Reiss & Co. 111 West Jackson Suite 1300
28.51 Acres	Chicago, Illinois 60604
	Naperville Park District 421 West Martin
16.25 Acres	Naperville, Illinois 60540

Total 44.76 Acres*

* The remaining 2.52 Acres consist of public streets and roads.

DEPARTMENT OF THE ARMY
OMAHA DISTRICT CORPS OF ENGINEERS
6014 U.S. POST OFFICE AND COURTHOUSE
OMAHA, NEBRASKA 68102

REPLY TO
ATTENTION OF

August 29, 1985

Real Estate Division

SUBJECT: Request for Information on Former Nike Sites

Dr. Harold T. Whitney, Jr.
Government Services Division
Law Environmental Services
P.O. Box 888013
Atlanta, Georgia 30356-0013

Dear Sir:

Reference your letter dated July 29, 1985, subject as above.

Enclosed is a listing of the Nike installations which are under the responsibility of the Omaha District. Attached to this listing are various documents which may be of use.

Considerable time has been spent researching Realty Historical Records and the documents provided are the most recent information. We know, however, there may have been many title changes since disposal. Due to the short suspense date, we are unable to furnish current title information.

A similar inventory was furnished USATHMA in November 1983.

If we may be of further assistance to you, feel free to call Mrs. Bev Talbott at area code 402-221-4395.

Sincerely,

Gary D. Blair
Chief, Real Estate Division

Enclosures

FINAL REPORT

INVESTIGATION OF FORMER NIKE MISSILE SITES FOR POTENTIAL TOXIC AND HAZARDOUS WASTE CONTAMINATION

VOLUME II

Prepared for:
DEPARTMENT OF THE ARMY
HUNTSVILLE DIVISION, CORPS OF ENGINEERS
HUNTSVILLE, ALABAMA
CONTRACT #DACA87-85-C-0104

Prepared by:
LAW ENGINEERING TESTING COMPANY
LES-GOVERNMENT SERVICES DIVISION
ATLANTA, GEORGIA
LEGS JOB NO. 601

March, 1986

TABLE OF CONTENTS

VOLUME I

SECTION		Page #
1.0	EXECUTIVE SUMMARY	1
2.0	INTRODUCTION	4
3.0	NIKE PROGRAM BACKGROUND	9
4.0	NIKE PROGRAM MILITARY ORGANIZATION	12
4.1	NATIONAL AIR DEFENSE ORGANIZATION	12
4.2	NIKE SYSTEM ORGANIZATION	13
5.0	NIKE BATTERY DESCRIPTION	16
5.1	BATTERY LAYOUT	16
5.2	GENERAL UNIT OPERATIONS	17
5.2.1	Launcher Area	17
5.2.2	Integrated Fire Control (IFC) Area	18
6.0	POTENTIAL CONTAMINATION SOURCE AREAS	19
6.1	GENERAL - WASTE FLUID DISPOSAL	19
6.2	LAUNCHER AREA	20
6.2.1	Missile Assembly Drainage and Seepage Systems	20
6.2.2	Diesel and Fuel Oil Storage Tanks	21
6.2.3	Magazine Sump Seepage Systems	21
6.2.4	Secluded Areas Adapted to "Unofficial" Dumping	22
6.2.5	Warheading/Fueling Area Drainage System	23
6.2.6	Motor Pool	23
6.2.7	Septic Systems	23

TABLE OF CONTENTS

VOLUME I (Cont'd)

6.3	INTEGRATED FIRE CONTROL (IFC) AREA	24
6.3.1	Motor Pool	24
6.3.2	Septic Systems	24
6.3.3	Diesel, Fuel Oil, and Gasoline Storage Tanks	25
7.0	POTENTIAL OPERATIONS PRODUCING CONTAMINATION	27
7.1	LAUNCHER AREA	28
7.1.1	Missile Assembly and Disassembly	28
7.1.2	Missile Fueling and Warheading	29
7.1.3	Missile Maintenance and Testing	30
7.1.4	General Launcher and Magazine Maintenance	33
7.2	INTEGRATED FIRE CONTROL (IFC) AREA	35
7.2.1	Operations Maintenance	35
7.2.2	Vehicle Maintenance	35
7.3	GENERAL OPERATIONS	36
7.3.1	General Facilities Maintenance	36
7.3.2	Utility Service	37
7.3.3	Deactivation	38
8.0	MASTER CONTAMINANT LIST	41
8.1	GENERAL	41
8.2	MASTER LIST CONTAMINANTS	41
8.3	OTHER MATERIALS CONSIDERED	44

TABLE OF CONTENTS
VOLUME I (Cont'd)

REFERENCES

APPENDICES

APPENDIX A - NIKE SITE LISTING FORMS
APPENDIX B - SITE DATA CORRESPONDENCE

VOLUME II

APPENDIX C - SAMPLING AND ANALYSIS PLAN

APPENDIX D - WELL INSTALLATION PLAN

APPENDIX E - HEALTH AND SAFETY PLAN

LIST OF ACRONYMS AND ABBREVIATIONS

ARAACOM	U.S. Army Anti-Aircraft Command
ARADCOM	U.S. Army Air Defense Command
ASTM	American Society for Testing and Materials
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFA	Continuous Flight Auger
COE	U.S. Army Corps of Engineers
CONAD	Continental Air Defense Command
CONUS	Continental United States
DERP	Defense Environmental Restoration Program
DOD	Department of Defense
EPA (US)	United States Environmental Protection Agency
gal	Gallons
HSA	Hollow Stem Auger
ICBM	Intercontinental Ballistic Missile
IFC	Integrated Fire Control
IRP	Installation Restoration Program
lb	Pounds
ml	Milliliter
MR	Mud Rotary
NATO	North Atlantic Treaty Organization
NORAD	North American Air Defense Command
OSHA	Occupational Safety & Health Administration
OVA	Organic Vapor Analyzer
PDP	Preliminary Determination Phase
PVC	Polyvinyl Chloride
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
SCBA	Self Contained Breathing Apparatus
VOA	Volatile Organic Analysis
USATHAMA	U.S. Army Toxic and Hazardous Materials Agency

ORIGINAL (Red)

APPENDIX C

SAMPLING AND ANALYSIS PLAN

GENERAL

SAMPLING AND ANALYSIS PLAN

CONTRACT NO. DACA87-85-C-0104

Prepared for:

Department of the Army
Huntsville Division, Corps of Engineers
P. O. Box 1600
Huntsville, Alabama 35807-4301

Prepared by:

Law Environmental Services
Government Services Division
P. O. Box 888013
Atlanta, Georgia 30356

March, 1986

WORK PLAN PREAMBLE

The initial effort described in the following Generic Plans is called the Preliminary Determination Phase (PDP). It is unique in terms of both breadth and complexity as compared with Remedial Investigations (RI) under CERCLA and Confirmation Studies under the IRP. Although many technical requirements apply especially in the Sampling and Analysis area, some latitude is available because of the preliminary nature of this effort.

These PDP studies are designed only to confirm or deny the existence of contamination which could have been caused by DOD, and are not equivalent to RCRA ground water quality assessments, or CERCLA investigations. Only when contamination is discovered is it necessary to follow the much stricter EPA guidance for site investigations.

The Plans are structured so that headings describing the intent of each section are given in **CAPITALIZED BOLD FACE TYPE.** This language would not appear in a site specific plan. In some cases, site specific examples are given. They appear in **Bold Face Regular Type.** The site specific data should be inserted in place of these examples for a specific case. Other suggested language for site specific plans is given in regular type. Where specific equipment is mentioned, "equivalent equipment" that performs the required task in an acceptable manner may be specified and used.

TABLE OF CONTENTS

		Page #
1.0	INTRODUCTION	1
2.0	PROJECT OBJECTIVE	3
3.0	PROJECT BACKGROUND	5
4.0	ORGANIZATION OF PROJECT TEAM	9
5.0	SAMPLING PROGRAM	11
	5.1 Types of Samples	11
	5.2 Number of Samples	12
	5.3 Location of Samples	14
	5.4 Sample Containers	15
	5.5 Sampling Protocols	16
	5.5.1 Ground Water	16
	5.5.1.1 Equipment	16
	5.5.1.2 Protocol	17
	5.5.2 Surface Water	19
	5.5.2.1 Equipment	19
	5.5.2.2 Protocol	19
	5.5.3 Soils	20
	5.5.3.1 Equipment	20
	5.5.3.2 Protocol	21
	5.6 Field Characterization of Samples	22
	5.7 Sample Preservation	22
	5.8 Laboratory Handling and Tracking	23
6.0	ANALYTICAL PROGRAM	24
7.0	QUALITY ASSURANCE PROGRAM	27
	7.1 Quality Assurance Samples	27
	7.2 Document Control	28
	7.3 QA/QC Plan	29
8.0	SAFETY CONSIDERATIONS	33
	8.1 Responsibilities	33
	8.2 Site Operating Procedures	34

1.0 INTRODUCTION

THIS SECTION DISCUSSES THE OBJECTIVE OF SAMPLING AND DESCRIBES THE CONTENTS OF THE SAMPLING AND ANALYSIS PLAN.

The basic objective of any sampling campaign is to collect samples that are representative of the media under investigation. Therefore, sampling methodology, handling and analysis must all be controlled within a narrow band of tolerance in order to provide samples that are representative of actual in-situ conditions. At the same time sampling activities and programs must incorporate practicality, simplicity, economics, reproducibility and safety considerations.

The following Sampling and Analysis Plan has been designed to encompass the preceding objectives. Procedures incorporated into this Plan are taken from a number of sources. However, much of the material has been derived from EPA hazardous waste sampling publications. A primary source document is "Characterization of Hazardous Waste Sites - A Methods Manual, Volumes I, II and III".

The NIKE Site Sampling and Analysis Plan contains the following sections:

- Project objective
- Project Background
- Organization of Field Team
- Sampling Program
- Quality Assurance/Quality Control
- Safety Considerations

Reference is made to the NIKE Site Well Installation Plan. The Well Installation Plan discusses well construction materials, specifications and procedures. It also presents a detailed description and rationale for well locations and depths.

*****

2.0 PROJECT OBJECTIVE

THIS SECTION DISCUSSES THE PROJECT OBJECTIVE AND THE OBJECTIVE OF THE SAMPLING AND ANALYSIS PLAN FOR EACH SITE. ENVIRONMENTAL AND HAZARDOUS SAMPLES ARE DESCRIBED, AND GRAB AND COMPOSITE SAMPLING TECHNIQUES ARE PRESENTED.

The primary objective of NIKE Site investigations (under U.S. Army Contract DACA87-85-C-0104) is to make a preliminary determination of whether Department of Defense (DOD) activities caused contamination at former NIKE missile sites. The word contamination includes hazardous or toxic substances found in ground water, surface water and soil with contaminants specified by regulatory criteria. A secondary objective of the program is to provide reliable data for subsequent investigations, if necessary, that would define the extent of contamination, its rate of movement, and potentially feasible remedial measures.

The primary objective of the NIKE Site Sampling and Analysis Plan is to provide consistent methodology and procedures for obtaining representative samples of the media (water and soil) under investigation. A representative sample is defined as "a sample that possesses the same qualities or properties as the material under investigation". In relation to media, two basic types of samples can be considered: environmental (diluted) and hazardous (concentrated) samples. Environmental samples (ambient air, soils, rivers, streams, or biota) are generally dilute and usually do not require the special handling procedures used for concentrated samples. However, in certain instances, environmental samples can contain elevated concentrations of pollutants and in such cases would have to be handled as hazardous samples. Hazardous samples, are those collected from drums, tanks, lagoons, pits, waste piles, fresh spills, etc., and required special handling because of their potential toxicity or hazard.

In general, when collecting environmental or hazardous samples, two basic types of sampling techniques are recognized: grab samples and composite samples. A grab sample is a single sample representative of a specific location at a given point in time. The sample is collected all at once and at one particular point in the sample medium. Composite samples are combinations of more than one sample collected at various sampling locations. Analysis of composite sample yields an average value.

At the NIKE Site, it is anticipated that environmental samples will be collected from soil, ground water, and surface water. Grab samples will be obtained from each sampling location as discussed in Section 5 (Sampling Program) of this Plan.

*****

3.0 PROJECT BACKGROUND

THIS SECTION PROVIDES SITE SPECIFIC BACKGROUND INFORMATION RELEVANT TO THE SAMPLING AND ANALYSIS PLAN. AN EXAMPLE OF TYPICAL SITE SPECIFIC LANGUAGE IS GIVEN. INFORMATION COMPRISING SEVERAL PARAGRAPHS OF SITE LOCATION AND LAYOUT INFORMATION CONSTITUTE THE FIRST PORTION OF THIS SECTION. SUBSEQUENT PARAGRAPHS DESCRIBE DATA OBTAINED IN THE SITE INSPECTION TRIP AND INCLUDES INFORMATION ABOUT SITE GEOLOGY, GROUNDWATER, TOPOGRAPHY AND PRESENT SITE LOGISTICS. EXAMPLE LANGUAGE THAT IS SITE SPECIFIC IS GIVEN IN BOLD FACE TYPE. EACH PLAN MUST DEVELOP ITS OWN SITE SPECIFIC INFORMATION FOR THIS SECTION.

The NIKE site is located in the town of Needham (Norfolk County) Massachusetts. Needham is a suburban community located in the southwestern part of the Metropolitan Boston Area, approximately 12 miles from downtown Boston. It is bordered by the cities of Newton and Boston on the northeast side and the Town of Wellesley on the northwestern side. The southern borders abut the Towns of Dover, Dedham and Westwood. The Charles River serves as the Town border for about three quarters of its perimeter. The Launcher Area of the site is located near the intersection of Charles River Street and Pine Street in Needham.

The site was formerly owned by the Department of Defense (DOD) from about 1956 until about 1967. The site contained a total of 86.20 acres, with 28.88 acres "Fee" and 57.20 acres "Easement". The primary tract of interest is the Launcher Area which consisted of 19.11 acres. Facilities at the Launcher Area included officers quarters, missile assembly and test building, a revetted fueling area, three silo areas, and other smaller structures. The IFC Area is located about one mile northeast of the site, but is not being considered in this investigation because of its lack of facilities that would apparently cause

contamination. The Launcher Area is presently owned by the City of Needham and has served no use since purchase. It is eventually intended for use for new school facilities.

At other NIKE facilities across the United States, records indicate the possibility that hazardous/toxic substances may have been released and/or disposed on similar sites. The primary area of concern is generally at the Launcher Area and is related to missile fueling/defueling, procedures operation and maintenance activities, and site deactivation. Therefore, ground water, surface water, and soil samples will be taken only at the Launcher Area and analyzed for hazardous constituents.

To better understand existing site conditions, a preliminary site investigation was performed. Agencies presently involved with the site were visited and regional data were obtained. Preliminary data were collected on general site characteristics to assist in locating the proposed ground water monitoring wells. Discussions were also conducted with local authorities, owners, and others that may have site information who were familiar with the Launcher Area. The following data were learned from the preliminary site investigation:

- The geology of Needham has examples of both bedrock and glacial action. The bedrock is primarily volcanic from the Devonian or Carboniferous Age along with some later massive conglomerate sediments and a small region of earlier granodiorite. The glacier features include drumlins, a large lake filled plain, eskers, kettle-holes, erratic boulders and bedrock striation. In addition, the course of the Charles River was extensively relocated as a result of the glacial deposits in Needham and surrounding communities.

- Needham lies entirely within the Charles River Watershed and is bordered on three sides by the Charles River. This river frontage totals 12.3 miles, or approximately 15 percent of

the total river length. The Charles River is Massachusetts' largest intrastate waterway.

- Topography at the Launcher Area slopes predominantly toward the eastern edge of the facility. Ground water is locally controlled by topography. Significant fill has been placed on the site to achieve construction grade for several of the buildings. Wetlands exist both to the east and northwest of the site.

- From initial information obtained during the site visit, the IFC Area appears to be free from surface contamination. It does not appear that any activities were conducted at the IFC Area that would have resulted in contaminating the site. Therefore, all subsequent investigations for this study will be focused at the Launcher Area.

- The Launcher Area was purchased by the City of Needham in 1968 for future educational purposes. It has not been developed since that time. Parkland exist adjacent the site and citizens using the parks occasionally gain access to the site.

- There is evidence that some dumping of refuse and possibly other materials has occurred in the past. It is not known to what extent past NIKE operations may have contributed to such refuse. The sampling program will consider this possibility.

- The site is heavily wooded and minor adjustments to boring locations may be necessary considering field access difficulties.

Based upon investigations at other NIKE facilities (Contract DACA87-85-D-0004), the NIKE literature study, (Contract DACA87-85-C-0104) and the site visit to the NIKE Site, contamination is most likely to be related to the following Launcher Area facilities: Missile assembly facilities, diesel and fuel oil storage facilities, magazine seepage facilities, secluded areas around the periphery of the site boundary convenient for dumping, missile warheading and fueling areas, the motor pool (when present) and septic systems (when present). Likely contaminants include: Volatile organic solvents, gasoline, diesel fuel, rocket fuel, fuel additives, paints and related substances, and battery electrolyte. The Sampling Program (Section 5.0) describes the proposed sampling procedures and analytical methodologies to address the potential contaminants at the launch site areas.

*****

ORIGINAL (Red)

4.0 ORGANIZATION OF PROJECT TEAM

THIS SECTION PRESENTS THE PROJECT TEAM ORGANIZATION FOR EACH SITE INVESTIGATION. KEY WORK ASSIGNMENTS AND PERSONNEL ARE DESCRIBED. EACH COMPANY SHOULD PROVIDE THE QUALIFICATIONS FOR EACH OF THE PERSONNEL LISTED FOR THE ORGANIZATIONAL POSITIONS DESCRIBED.

Key project participants for the NIKE Site investigation include the project manager, senior technical staff, site manager, safety officer, laboratory manager, and work party. Described in the following paragraphs are the proposed project assignments and responsibilities. A list of individuals expected to serve in each capacity and a brief synopsis of the participants experience for similar investigations should be included in each individual plan.

- PROJECT MANAGER - Is responsible for overall management of the NIKE Site Investigation. Coordinates between office and field personnel, manages administrative requirements and schedules, oversees technical project approach, implementation, and report preparation.

- SENIOR ENGINEER - Provides technical oversight and direction for all aspects of the site investigation and data evaluation, and serves as Senior Author of the engineering report.

- SITE MANAGER - Is responsible for implementation of Sampling and Analysis Plan, Well Installation Plan, Quality Assurance/ Quality Control, and Safety during the field investigation phase. Reports directly to the Project Manager.

- SAFETY OFFICER - Oversees the site specific Health and Safety Plan for the NIKE Site, conducts personnel training,

administers company hazardous assessment and surveillance medical program, and coordinates with Site Manager for site safety. He is available for consultation during the actual investigation.

- LABORATORY MANGER - Is responsible for handling and analysis of ground-water and soil samples received by the laboratory. He also oversees sample travel through the lab, analytical procedures, quality control, reporting and sample disposal.

- WORK PARTY - Performs on-site tasks contained in the Sampling and Analysis Plan and Well Installation Plan under the direction of the Site Manager.

*****

ORIGINAL (Red)

5.0 SAMPLING PROGRAM

THIS SECTION DESCRIBES THE PROPOSED SAMPLING PROGRAM FOR EACH SITE. THE PROGRAM INCLUDES THE FOLLOWING INFORMATION: TYPES OF SAMPLES, NUMBER OF SAMPLES, LOCATION OF SAMPLES, SAMPLE CONTAINERS, SAMPLING PROTOCOL, FIELD CHARACTERIZATION TECHNIQUES, SAMPLE PRESERVATION, AND LABORATORY HANDLING. A FIGURE SHOWING THE SAMPLING LOCATIONS SHOULD BE PROVIDED. THE FIGURE SHOWN HEREIN IS AN EXAMPLE OF A SPECIFIC SITE.

The objective of the NIKE Site Investigation program is to make a preliminary determination of whether DOD activities caused contamination of the media (soil, ground water, and surface water) at the facility. In order to accomplish this objective, representative samples of the media must be obtained. The following Sampling Program provides a methodical and controlled procedure for collecting and handling media samples at the NIKE Site. Included are subsections that discuss types, numbers, locations, containers, protocols, field characterization, preservation, labeling, and shipping of the samples. Analytical procedures are discussed in the following section.

5.1 Types of Samples

Media to be sampled at the NIKE Site will include soil, ground water, and surface water. As such, the samples will be environmental rather than hazardous (or concentrated) samples. Both grab and composite sampling techniques can be used too collect environmental samples. However, the overall objective of the NIKE site investigation program is to provide a one time determination of whether DOD contamination exists. Therefore, grab samples will be collected from the soil, surface water, and ground water at the NIKE Site.

5.2 Number of Samples

IT IS SUGGESTED THAT APPROXIMATELY TWELVE GROUND-WATER (INCLUDING SURFACE WATER) AND TWELVE SOIL SAMPLES BE TAKEN FOR EACH SITE. HOWEVER, VARIATIONS AT EACH SITE ARE EXPECTED DUE TO SITE SPECIFIC CONSIDERATIONS. AN EXAMPLE IS GIVEN AS FOLLOWS. At this NIKE Site, seven ground-water, five surface water and twelve soil samples will be collected. These will include the following:

At this NIKE Site, seven ground-water, four surface water (involving open silos) and fourteen soil samples will be collected. These will include the following:

- Ground Water	No. of Samples
. 1 sample will be collected from each of the 4 wells	4
. 1 duplicate (QA) sample from 1 of the wells	1
. 1 duplicate (QA) sample for spiking from 1 of the wells	1
. 1 travel blank (QA)	1
TOTAL	7

ORIGINAL (Red)

- Surface Water

	No. of Samples
• 1 sample (at different locations) will be collected from each surface impoundment (two open silos)	2
• 1 duplicate (QA) sample from each location	2
TOTAL	4

- Soil

	No. of Samples
• 1 sample from each of the 4 well borings (0-1.5 feet deep)	4
• 1 sample from each of 2 auger borings (5-10 feet deep) adjacent tanks	2
• 6 samples throughout the site collected with a hand auger (0-1.5 feet deep)	6
• 1 duplicate (QA) soil sample	1
• 1 duplicate (QA) soil sample for spiking	1
TOTAL	14

In addition to the sampling program described above for the analytical phase of the investigation, additional samples shall be taken for the Corps of Engineers' laboratory at Missouri River Division (MRD) in Omaha for QA analyses. For this purpose, a number of split samples equal to approximately ten percent of the

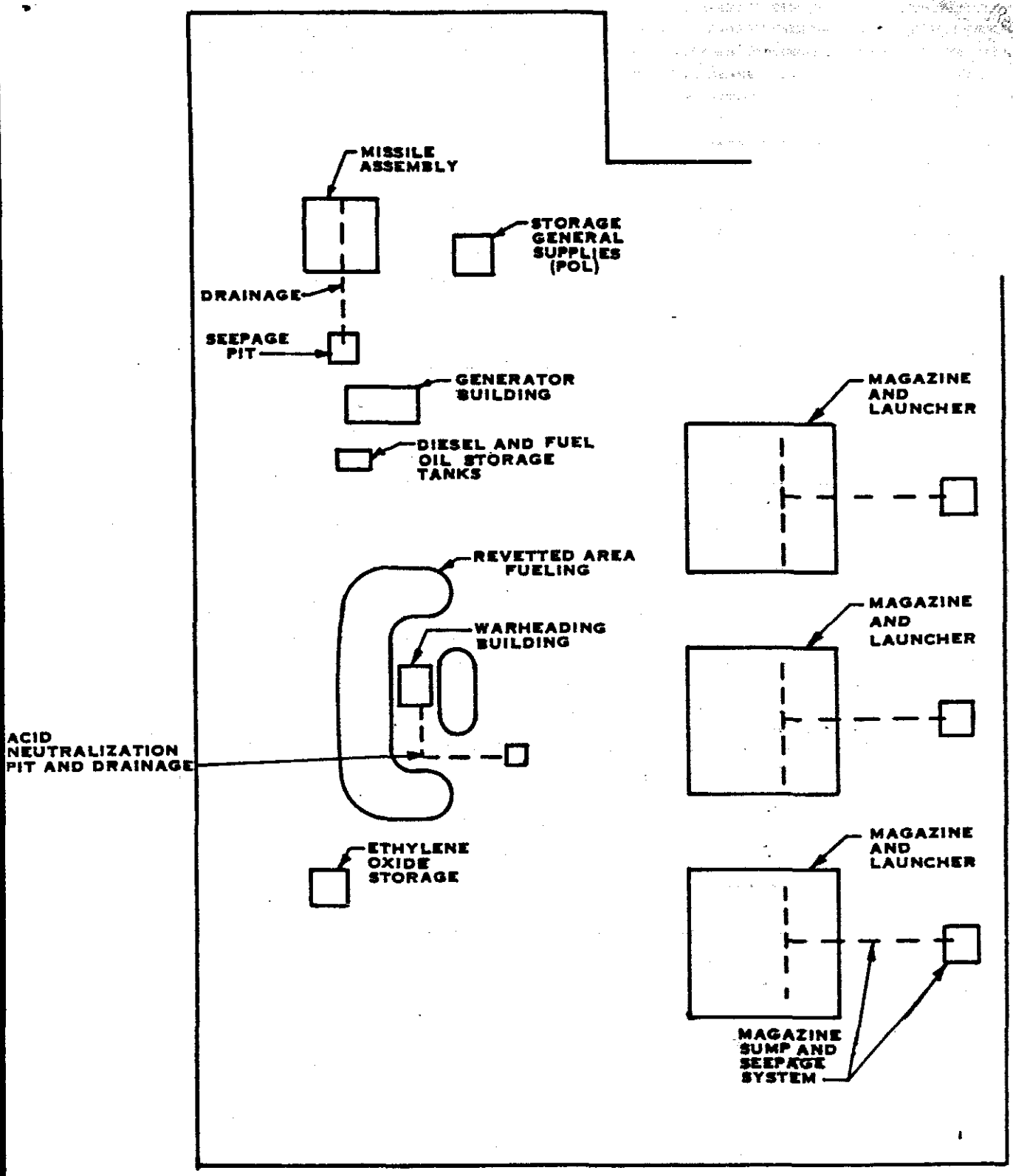
total (not less than one per set) shall be taken. In the example given, there should be one additional water and one additional soil sample taken for this purpose. One set of Field Blanks is also required for MRD QA purposes.

5.3 Location of Samples

SEVERAL PARAGRAPHS SHOULD BE GIVEN WHICH RELATE TO THE SITE MAP AND EXPLAIN THE RATIONALE FOR THE SAMPLING LOCATIONS. AN EXAMPLE IS GIVEN WHICH RELATES TO THE SAMPLING LOCATION PLAN (FIGURE 1). THE RATIONALE GIVEN FOR LOCATING THE OBSERVATION WELLS AND SAMPLING POINTS IS REASONABLY TYPICAL.

This NIKE Site Launcher Area contains a number of places where contamination of the site media could have occurred. These include the officers quarters, the missile assembly and test building, a revetted fueling area, three underground silo areas and random locations around the site and along the site periphery where surface drainage may have taken place. A site map showing various facilities at the NIKE Site Launcher Area is provided as Figure 1. In addition to showing the Launcher Area facilities, Figure 1 also shows the proposed location for each of the sampling points. Rationale for the sample locations are discussed as follows and are also presented in the Well Installation Plan (Appendix A, to this document).

Based upon the information gathered during the initial site visit, the NIKE Site could be monitored using the scenario of sample locations outlined in Figure 1. The wells are positioned around the periphery of the site and in an apparent down-gradient position from the key NIKE base units which may have caused site contamination. Since the ground water table is suspected to be essentially flat with some impact of topography, locations were picked primarily to be adjacent facilities that might cause contamination in the direction that is topographically down-gradient from these facilities. Soil samples are planned to be



GENERALIZED NIKE SITE

CONTRACT DACA 87-85-0104

LAW ENVIRONMENTAL SERVICES

MARIETTA, GEORGIA

LAUNCHER AREA

FIGURE

taken from topographic low areas, from shallow auger borings adjacent to fuel tanks, and from each of the monitoring wells to provide any possible soil correlation with the monitoring well data. In addition, surface water samples will be taken from each of the two silos that are open. There are no other surface water features on the site. The sample locations as now envisioned are given on Figure 1. The precise location of the samples will be left to the discretion of the Site Manager, based on final utility clearance, etc.

5.4 Sample Containers

Samples collected and prepared in the field shall include: groundwater samples, surface water samples including samples of water standing in the underground missile storage structures (if present), soil samples, and field control samples, as described above. All sample collections and subsequent sample handling procedures shall be in accordance with the sampling analysis - QC/QA plan and with applicable EPA requirements. Sampling containers will consist of plastic (polyethylene) and glass bottles as shown in Tables I and II (Section 6.0) depending upon the analytical method that will be utilized.

All container caps have Teflon liners. Each container is labeled giving the sample identification, date, sampler, and project number.

Prior to use at the NIKE Site, the containers and caps will all go through cleaning procedures including: hand-washing in Alconox or equivalent water solution at 150°F; rinse with hot tap water, rinse with cold tap water; rinse with distilled water. In addition, containers used for collection of samples to be analyzed for EPA organic priority pollutants will be cleaned in the appropriate manner for the specific container. This process is discussed in more detail in Section 7.3.

5.5 Sampling Protocols

Different sample matrices require different sampling techniques, as described herein. Care must be taken to determine the best practical sampling procedure that will result in obtaining representative samples. The samples must maintain the integrity of the original medium through collection, transportation and delivery to the analyst. The NIKE Site samples will be collected and containerized as described in the following paragraphs for each medium at the site.

5.5.1 Ground Water

The subsurface is a unique heterogeneous environment. Gas exchange, biological and other chemical reactions and conditions are different from the surface environment. Ground water is somewhat insulated from surface temperature and pressure variations. Rapid and significant changes can occur in ground-water sample upon exposure to the surface (sunlight, temperature and pressure). Therefore, ground-water sampling is conducted in a manner to minimize interaction of the sample and the surface environment. The equipment and protocol for collecting ground-water samples at the NIKE Site is discussed in the following paragraphs.

5.5.1.1 Equipment

Many variations of ground-water sampling equipment are available depending upon the objective of program. For the NIKE Site, ground-water samples will be obtained with pre-cleaned PVC bailers. Pre-cleaning will consist of hand washing inside and outside with Alconox, or equivalent detergent and water solution, and rinsing with reagent water. Bailers will be air-dried and wrapped in plastic to prevent contamination prior to use. A dedicated bailer will be used for each well at the site to

minimize the potential for cross-contamination. If a peristaltic pump is used for pumping or sampling, dedicated Tygon tubing will be utilized for each well.

ORIGINAL (Red)

5.5.1.2 Protocol

The sampling protocol at the NIKE Site will be as follows:

a. Measure Water Level - Using clean, non-contaminating equipment, (i.e., an electronic level indicator, or a fiberglass tape and high intensity light source) determine the water level in the well and calculate the fluid volume in the casing and screen.

b. Purge Well - Remove at least 5 well volumes with a bailer, or peristaltic pump. Groundwater samples shall be collected only after the water levels in the monitoring wells have been measured and recorded, and the wells have been pumped or bailed (with clean equipment), so as to remove a quantity of water at least equal to five (5) times the submerged volume of the casing. In those cases where the well is not able to recharge at a rate sufficient to evacuate five (5) well casing volumes, the well shall be pumped or bailed dry. When the well has recharged to a sufficient degree, the sample may then be obtained. If the well is incapable of producing a sufficient volume of samples at each incidence of sampling, the largest quantity possible shall be collected.

c. Collect Sample - Lower the bailer slowly until it contacts the water surface and allow the bailer to sink to the desired depth and fill with a minimum of surface disturbance. Slowly withdraw the bailer, being careful to prevent contact of the bailer line with the ground. Tip the bailer and slowly discharge the contents into the appropriate containers. Rinse the ground water sample

containers with a portion of the ground water prior to filling. Repeat the process as necessary to fill each container to the required volume. Samples for volatile organics should be completely filled leaving no air space above the liquid portion (to minimize volatilization). Samples for hydrocarbons should have a headspace. Check that a Teflon-liner is present in the cap and secure the cap tightly. All samples are taken as quickly as possible once the sampling process begins, generally well within the 3 day guideline. Sample preservation is discussed in Section 5.7.

d. Label Sample - Once the sample is collected, label each container providing the following data: sample identification number, project number, date, time, method of preservation, analysis required, and person sampling. Record the information in the field log book and complete all chain-of-custody (Exhibit 1) and request for analysis (Exhibit 2) documents. The field log book will consist of a bound note book. All entries and labeling will be waterproof or indelible ink.

e. Handling and Shipping - Place the properly labeled sample bottle in the appropriate carrying container and maintain the sample at 4°C throughout sampling and transportation. The shipping container will be a sturdy cooler. Each sample will be wrapped with bubble wrap. Additional bubble wrap will be placed between the bottles for protection against breakage. "This Side Up" and "Fragile" labels will be placed on the cooler. The lid of the cooler will be taped shut with fiber tape or duct tape. Samples are shipped from the site directly to the laboratory by overnight courier. Chain-of-custody and request for analysis documents are shipped in air-tight plastic bags in each container (taped to the inside of the lid) with applicable samples. The laboratory is notified by phone of the sample shipment.

CH... ...ODY ...ORD
...PORATION

EXHIBIT 1

SAMPLER(S): _____ HIGH HAZARD?: _____ DATE COLLECTED: _____

REASON FOR SAMPLING: _____ DESTINATION: _____

	SAMPLE NUMBER	DESCRIPTION	TIME COLLECTED	AMOUNT COLLECTED	SAMPLE TYPE	CONTAINER TYPE	CONDITION ON RECEIPT
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							

SPECIAL INSTRUCTIONS: _____

1. Relinquished by: _____
Received by: _____

2. Relinquished by: _____
Received by: _____

3. Relinquished by: _____
Received by: _____

4. Relinquished by: _____
Received by: _____

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***Transfer of Custody Instructions: Sign full name, company name, and date/time of transfer in appropriate spaces above to ...

IT CORPORATION

ORIGINAL (Red)

EXHIBIT 2

IT ANALYTICAL SERVICES
5815 Middlebrook Pike
Knoxville, TN 37921
(615)588-6401

REQUEST FOR ANALYSIS

This Form Must be Shipped With Samples
Please Do Not Mail Under Separate Cover

Date Samples Shipped_____

REPORT TO:_____ BILL TO:_____

ATTN:_____ _____

_____ _____

_____ _____

PHONE NUMBER:_____ PURCHASE ORDER NO.: _____

NO. & TYPE OF SAMPLES (i.e. water, sediment, waste, specific chemical, etc): _____

_____

_____

_____

ANALYSIS REQUIRED: _____

_____

_____

_____

TURNAROUND TIME NEEDED (see Service Policies on back):

_____Normal, usually 5-15 working days _____RUSH, 3 working days (50% surcharge

_____Other,_____

POSSIBLE HAZARD IDENTIFICATION (Please note if sample (s) are hazardous materials and/or suspected to contain high levels of chemical compounds):

_____Poison _____Skin Irritant _____Toxic _____Other, _____

*Identify hazardous material or chemical matrix: _____

_____

Samples Requiring Disposal As Hazardous Materials Are Subject to Additional Charges*

REMARKS:_____

*See Service Policies on Reverse Side

5.5.2 Surface Water (Impoundment or Water Courses)

Surface water samples will be obtained at different locations around the NIKE Site. These locations should include any accessible silos which contain water. The following section presents a discussion of equipment and protocol for surface water sampling at the NIKE Site.

5.5.2.1 Equipment

A pond sampler is used to collect grab liquid samples from ponds, pits, lagoons and similar reservoirs and slow moving water courses. A typical device is shown in Figure 2. Pre-cleaning shall consist of hand washing with Alconox, or equivalent detergent, and water solution, and rinsing with reagent water. The sampling device will be cleaned between each use as necessary.

5.5.2.2 Protocol

Collecting surface water samples with the pond sampler will be as described in the following sections. It is noted that this procedure is for samples taken at the water surface. The pond sampler shown is not designed to take samples at depth. Depth of surface water samples should be considered on a site specific basis.

a. Collect Sample - Assemble the pond sampler making sure that the sampling beaker and the bolts and nuts that secure the clamp to the pole are tightened properly. With proper protective garment and gear, take grab samples by slowly submerging the beaker with minimal surface disturbance. Retrieve the pond sampler from the surface water with minimal disturbance. Remove the cap from the sample bottle and slightly tilt the mouth of the bottle below the

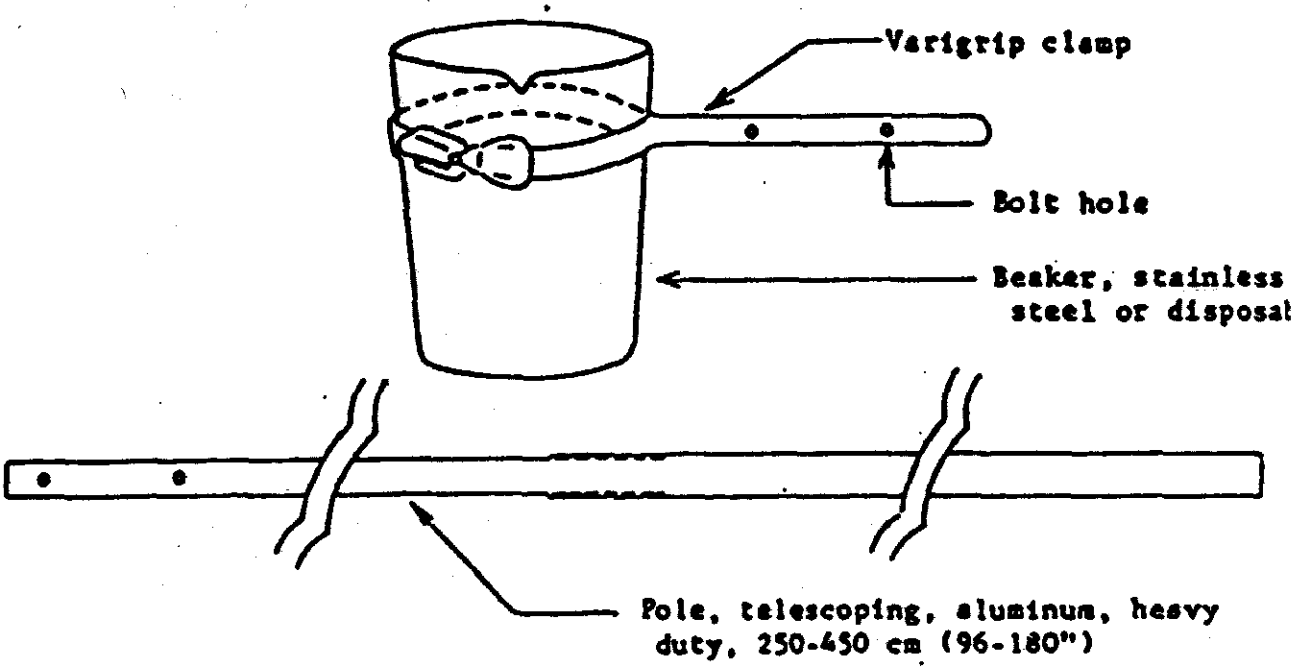

Figure 2 Pond sampler.

dipper/device edge. Empty the sampler slowly, allowing the sample stream to flow gently down the side of the bottle with minimal entry turbulence. Continue delivery of the sample until the required volume is obtained (same as ground water samples). Check that a Teflon liner is present in the cap and secure the cap tightly. Sample preservation is discussed in Section 5.7.

b. Label Sample - Label the sample bottle with an appropriate sample tag (same as ground water samples). Be sure to label the tag carefully and clearly, addressing all the categories or parameters. Record the information in the field log book and complete the chain-of-custody documents.

c. Handling and Shipping - Place the properly labeled sampled bottle in an appropriate carrying container (as previously described) maintained at 4°C throughout the sampling and transportation period. Samples are shipped from the site directly to the laboratory by overnight courier. Chain-of-custody and request for analysis forms documents are shipped in air-tight plastic bags in each container with applicable samples. The laboratory is notified by phone of the sample shipment.

5.5.3 Soils

Soil samples will be obtained at different locations around the NIKE Site using different sampling techniques. The following section presents a discussion of equipment and protocol for soil sampling at the NIKE Site.

5.5.3.1 Equipment

Two basic types of equipment will be used to collect soil samples: a stainless steel hand auger and a stainless steel scoop. Specific use of these tools will depend upon the sampling

location and technique. The stainless steel hand auger will be used to obtain soil samples around the site buildings. The stainless steel scoop will be used to collect the sample from the auger cuttings at each borehole. Each device will be pre-cleaned before use to minimize potential cross-contamination. Pre-cleaning shall consist of hand washing with Alconox, or equivalent detergent, and water solution, and rinsing with reagent water.

5.5.3.2 Protocol

Collecting soil samples with the stainless steel hand auger and scoop will be as follows:

a. Collect Sample - Hand auger from the land surface to a depth of six inches, emptying the auger as necessary into a clean, stainless steel tray. Soil samples will also be obtained from the soil cuttings at each borehole. These will be collected from drill cuttings of the top 1.5 feet of the boreholes with a stainless steel scoop. Composite the sample and transfer into an appropriate sample jar with a stainless steel lab spoon or equivalent. Check that a Teflon liner is present in the cap and secure the cap tightly.

b. Label Sample - Label the sample bottle with the appropriate sample tag. Be sure to label carefully and clearly, addressing all the categories, or parameters. Complete all chain of custody documents and record the sampling event in the field log book.

c. Handling and Shipping - Place the sample jar in a appropriate carrying container (as previously described) maintained at 4°C throughout the sampling and transportation period. Samples are shipped from the site directly to the laboratory by overnight courier. Chain-of-custody and

request for analysis forms documents are shipped in air-tight plastic bags in each container with applicable samples. The laboratory is notified by phone of the sample shipment.

5.6 Field Characterization of Samples

Certain parameters regarding ground-water samples can vary considerably with time. Those of primary interest regarding the NIKE Site are pH, temperature and conductivity. Therefore, these parameters will be measured in the field when the samples are obtained.

- Field pH will be measured with a Gallenkamp Field pH stick. The instrument will be field calibrated with pH 4, pH 7 and Ph 10 buffer solutions before beginning each days use and after use on two consecutive wells. The pH stick will be rinsed with reagent water between each use.

- Temperature and specific conductance will be measured with a portable YSI (Yellow Springs Instrument) S-C-T (Salinity, Conductivity, Temperature) meter. Calibration of the instrument is performed at the factory periodically. The instrument probe will be rinsed with reagent water between each use.

5.7 Sample Preservation

All of the samples will be stored and shipped on ice to maintain the temperature at approximately 4°C. Additionally, monitoring well samples to be analyzed for dissolved metals will be filtered in the field and acidified to pH 2 with two milliliters (ml) of nitric acid (HNO_3) per liter of sample. Surface water samples to be analyzed for total metals will be acidified in the field with

two milliliters (ml) of nitric acid (HNO_3) per liter of sample. Other laboratory preservation requirements are carried out as necessary for each Analytical Procedure.

5.8 Laboratory Handling and Tracking

Upon receipt of the samples in the laboratory, the Sample Coding Specialist will inventory the coolers and samples, reporting condition, temperature and numbers, and sign the Chain-of-Custody forms. The sample information and analytical requirements will be logged into the Perkin Elmer 2000 Laboratory Information Management System. The samples are then stored and logged into a refrigerator until logged out for analysis. The VOA vials are stored in a separate refrigerator exclusively used for volatiles.

*****

6.0 ANALYTICAL PROGRAM

THIS SECTION PRESENTS THE PROPOSED ANALYTICAL PROGRAM FOR EACH SITE. THIS PROGRAM IS BASED ON THE CONTAMINANTS LIST AS PRESENTED IN TABLE III IN THE REPORT. IF A DEVELOPED METHOD IS USED, IT SHOULD BE DESCRIBED IN THE MANNER SHOWN FOR THE EXAMPLE GIVEN FOR HYDROCARBONS.

The analytical methodology proposed for use at the NIKE Site is referenced by matrix in Tables I and II. The methods are summarized as follows:

Purgeable Halocarbons and Aromatics

The purgeable halocarbons and volatile aromatics will be analyzed by the USEPA purge and trap gas chromatography/mass spectrometer procedure (EPA Method 624 for water and Method 8240 for soil). This will include the halogenated and non-halogenated solvents on the USEPA priority pollutant list.

Hydrocarbons

One of the analytical needs for the NIKE Sites is to have an analytical method which could detect and quantitate the presence in surface water, groundwater, or soil of gasoline or diesel fuel which may have been spilled, leaked or disposed on the site. The method being utilized for this purpose is based on an internally used method obtained from a specific USEPA approved laboratory to rapidly evaluate gasoline and diesel fuel in water and soil from leaking underground storage tanks and subsequent monitoring during site mitigation. The method is a modification of the method entitled: ASTM D 3328-78 (Reapproved 1982) Standard Methods for Comparison of Waterborne Petroleum Oils by Gas Chromatography. The water microextraction approach was derived from the USEPA Effluent Guidelines' approach to rapidly monitor water samples.

TABLE I

ANALYTICAL PROCEDURES

Water Samples

Parameter	Method	Container	Preservation	Maximum Holding Time	Minimum Volume	Detection Limit
Metals (ICAP)	EPA 200.7[a]	High density Polyethylene	Cool to 4°C HNO_3 to pH2 after field filtration	6 months (except Hg 28 days)	1 Liter	Variable (<.003 - <1 ppm)
Purgeable Halocarbons	EPA 624[b]	Glass, Teflon lined cap	Cool to 4°C	14 days	2-40 ml Vials	<10 ppb
Purgeable Aromatics	EPA 624[b]	Same sample	Cool to 4°C	14 days	Same sample	<10 ppb
Petroleum Hydrocarbons	Developed[c] Method	Glass, Teflon lined cap	Cool to 4°C	28 days	1 Liter	Gas <1 ppm Diesel <0.5 ppm

Notes: a. Instrument used is ICAP Emission Spectrometer
b. Instrument used is Gas Chromatograph/Mass Spectrometer
c. Developed Method - See text. Instrument used is Gas Chromatograph

TABLE II

ANALYTICAL PROCEDURES

Soil Samples

Parameter	Method	Preservation	Maximum Holding Time	Minimum[b] Volume	Detection Limit
Metals (ICAP)	EPA 3050[a] EPA 6010	Cool to 4°C	6 months (except Hg 28 days)	1 Liter	< 1 ppm to < 100 ppm
Purgeable Halocarbons	EPA 8240	Cool to 4°C	14 days	2 - 40 ml Vials	< 10 ppb
Purgeable Aromatics	EPA 8240	Cool to 4°C	14 days	Same Sample	< 10 ppb
Petrolem Hydrocarbons	Developed Method	Cool to 4°C	28 days	Same sample as Metals	Gas < 50 ppm Diesel < 20 ppm

Notes: a. Preparation Method

b. All containers are glass, Teflon lined cap

This analytical approach was taken to allow chromatographic comparison of standards made from gasoline and diesel fuel with water and soil extracted samples to qualitate their presence. The EPA methods and Standard Methods [1] for oil and grease do not differentiate diesel fuel, extractable organic compounds, animal or vegetable oils and would give very poor recovery for gasoline.

To the best of our knowledge, the Corps of Engineers or USEPA does not have a published method for gasoline/diesel fuel in water or soil. The US Army Corps of Engineers' Report[2] has several references to determining petroleum hydrocarbons by gas chromatography with flame ionization detection.

The procedure is briefly described as follows: Perform microextraction of a water sample (100 ml H_2O) with 2 ml of hexane for 10 minutes in a volumetric flask with full inversion during extraction. The hexane will then be analyzed by gas chromatography with a non-polar silicon column and flame ionization detection using a temperature program run. The sample will be compared to gasoline and motor oil standards and quantitated against the best comparative standard. Soils will be analyzed as above following a 1:1 extraction with hexane using mechanical shaking and sonification.

References:

(1) Standard Methods for the Examination of Water and Wastewater, 1985, 16th Edition APHA-AWWA-WPCF.

(2) US Army Corps of Engineers Technical Report, D77-26, Assessment and Significance of Sediment - Associated Oil and Grease in Aquatic Environments, November 1977.

Metals

The water and soil samples will be analyzed for metals following acid digestion by inductively coupled plasma (ICAP) technique following EPA procedure 200.7 (water) and 6010 (soil). Method 3050 is a preparatory step for the soil matrix samples.

Other Methods

Other methods of analysis can be utilized in the analytical program at NIKE sites. However some inherent difficulties are evident with other methodologies. For example, for purgeable halocarbons and volatile aromatic compounds in a water matrix, EPA Methods 601 and 602 (gas chromatography) are acceptable, but these methodologies require a confirmatory step to positively identify constituents. The confirmation step must be either EPA Method 624 (GC/MS) or use of a second GC column. Purgeable halocarbons and volatile aromatics in a soil matrix can be analyzed by Method 5030, Method 8010, and Method 8020 but these procedures may give a false positive reading due to naturally occurring interferences (i.e., decaying vegetation, etc.). For hydrocarbons, EPA Method 418.1 for oils and greases may be acceptable, but low levels of gasoline and diesel fuels can be driven off during the drying process.

A list of substances identified for each of the Analytical Methods is given in Table III.

*****

TABLE III

SUBSTANCES IDENTIFIED BY EACH ANALYTICAL METHOD

VOLATILE ORGANICS

acrolein
acrylonitrile
benzene
bromoform
carbon tetrachloride
chlorobenzene
chlorodibromomethane
chloroethane
2-chloroethyl vinyl ether
chloroform
dichlorobromomethane
dichlorodifluoromethane
1,1-dichloroethane
1,2-dichloroethane
1,1-dichloroethylene
1,2-dichloropropane
cis-1,3-dichloropropylene
trans-1,3-dichloropropylene
ethyl benzene
methyl bromide
methyl chloride
methylene chloride
1,1,2,2-tetrachloroethane
tetrachloroethylene
toluene
trans-1,2-dichloroethylene
1,1,1-trichloroethane
1,1,2-trichloroethane
trichloroethylene
trichlorofluoromethane
vinyl chloride

METALS

Aluminum
Antimony
Arsenic
Barium
Beryllium
Boron
Cadmium
Calcium
Chromium
Cobalt
Copper
Iron
Lead
Lithium
Magnesium
Manganese
Molybdenum
Nickel
Selenium
Silicon
Silver
Sodium
Strontium
Thallium
Tin
Titanium
Vanadium
Zinc

HYDROCARBONS

Diesel Fuel
Gasoline

7.0 QUALITY ASSURANCE PROGRAM

THIS SECTION DESCRIBES THE QUALITY ASSURANCE/QUALITY CONTROL PROGRAM FOR EACH SITE. THE PROGRAM INCLUDES A GENERAL DESCRIPTION OF QUALITY ASSURANCE SAMPLES AND DOCUMENT CONTROL, AND THE SITE SPECIFIC QA/QC PROGRAM. CHAIN-OF-CUSTODY AND REQUEST-FOR-ANALYSIS FORMS ARE SHOWN.

The major concerns of a QA/QC plan are quality assurance samples and document control (chain-of-custody). Each of these areas is discussed in the following paragraphs.

7.1 Quality Assurance Samples

Generally it is recommended that quality assurance (QA) samples should be obtained in all sampling surveys. The purpose of QA samples is to verify the quality of the data obtained from the sampling and analytical programs. Basically, four types of samples can be used in a QA program: Sample blanks, duplicates, split samples and spiked samples. Each type is discussed below.

- Sample (Travel) Blanks -- These are samples of deionized or distilled water that are handled in the same manner as the field sample and subsequently analyzed to identify possible sources of contamination during collection, preservation, handling, or analysis.

- Duplicates -- Duplicate samples are essentially identical samples collected at the same time, in the same way, and contained, preserved, and transported in the same manner as the field samples. These samples are often used to verify the reproducibility of the data.

- Split Samples -- Split samples are duplicate samples given to the owner, operator, or person in charge for separate independent analysis.

- Spiked Samples -- Spiked samples are duplicate samples that have a known amount of a substance of interest added to them. These samples are used to corroborate the accuracy of the analytical technique and could be used as an indicator of sample quality change during shipment to the laboratory.

Quality assurance samples collected at the NIKE Site are discussed in a following section of this Plan.

7.2 Document Control

Strict adherence to document and data control are essential elements of quality assurance and quality control for hazardous site investigations. The purpose of document control is two-fold: (1) to ensure document availability during and after project completion; and, (2) to document sample handling. Important documents generated and utilized during hazardous investigations include maps, drawings, photographs, work plans, QA plans, log books, data sheets, etc. These documents will be available for inspection at any time during the investigation of the NIKE Site. In addition, all relevant documents will be incorporated into the engineering report for the project.

Chain-of-custody procedures document the sample identity, handling and shipping procedures and, in general, sampling personnel are responsible for the care and security of samples from the time the samples are taken until they are turned over to the shipper or laboratory. A sample chain-of-custody form is presented as Exhibit 1.

7.3 QA/QC Plan

The laboratory will incorporate QA/QC procedures applicable to specific laboratory analyses which meet or exceed those recommended in Test Methods for Evaluating Solid Wastes (SW-846), or EPA Handbook for Analytical Quality Control in Water and Wastewater Laboratories (EPA 600/4-79-019). In addition to these routine quality control procedures, the following checks will be performed during the laboratory analysis.

Duplicate Sample - A duplicate water sample taken in the field and labeled with different identification numbers will be submitted for analysis with each batch of samples.

Sample(Travel) Blank - To monitor the potential contamination during sampling, handling and shipping of the samples, a set of water field blanks will be submitted with the other samples.

Method Blank - A method blank consisting of reagent water will be analyzed in the laboratory by each of the analytical procedures being performed on samples.

Spiked Sample - A duplicate ground-water and soil sample will be taken and spiked with known quantities of several of the compounds/metals of interest and analyzed to determine recovery.

Container cleaning procedures are an essential part of quality control. The methodology utilized by the analytical laboratory for cleaning containers is described below:

> The initial cleaning step will be the same for all types of containers. Containers will be hand-washed in a Alconox or equivalent water solution at approximately 150°F. Subsequently, each container will be given three rinses: hot tap water, cold tap water, and distilled water. In addition, containers which are used for the collection of

samples to be analyzed for EPA organic priority pollutants will be cleaned as follows:

- Vials and one liter glass containers - Bake for four hours at 110°C.

- One liter containers for organics - Rinse with nanograde methanol.

Container caps and liners will be cleaned as outlined above for containers.

All analytical results and QA/QC results will be reviewed by the project manager and quality assurance coordinator. Corrective action will be taken as necessary.

A TYPICAL LABORATORY APPROACH TO QA/QC REGARDING POSSIBLE METHOD PROBLEMS IS PRESENTED AS AN EXAMPLE. THIS IS NOT INTENDED TO LIMIT CONSIDERATION OF OTHER POSSIBLE METHOD PROBLEMS.

Determination of Metals by
Inductively Coupled Plasma Emission Spectrometry (ICPES)

Environmental samples are analyzed by ICPES to determine metals content following EPA Methods 200.7[1] for water and 3050/6010[2] for soils, sediments, sludges, etc. It is to be noted that the methods differ only in the means of sample preparation, the latter requiring a more vigorous digestion to effect sample dissolution. Experience has shown that most problems encountered in the use of these methods are due to sample matrix interferences. Some specific problems which may occur, and their solutions, are as follows:

Problem	Solutions
Sample contamination in the labortory	Use of method/reagent blanks with each batch of samples processed will show any systematic contamination problem, in the event of which the source is identified and corrected prior to reanalysis of the samples.
Instrument improperly calibrated	Use of an independent calibration check of standard at the beginning of each run confirms calibration.
Instrument malfunction during analysis run	Regular use of check standards continuously monitors instrument condition.
Sample matrix interferences	Use of background correction, inter-element interference correction software, and dilution and reanalysis when any analyte concentration exceeds the known linear range of the instrument will correct for or point out most interferences. Regular use of duplicate and spiked samples are applied to determine precision and accuracy of the methods.

References:

(1) "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, USEPA (1979), and subsequent amendments (1982).

(2) "Test Methods for Evaluating Solid Waste" (2nd ed.), SW-846, USEPA (1982), and subsequent amendments (1984).

Volatile Priority Pollutants - Purge and Trap
GC/MS EPA Method 624 (Water) and SW-846 Method 8240 (Soil)

Problems	Solutions
Detectable quantities in blank water	Blank subtraction values above detection limits are investigated for possible contamination.
Compounds of interest exceed calibration range, i.e., greater than 200 ppb	If no peaks saturate the detector, the report is analyzed. If peaks saturate detector, dilute sample and re-analyze.
Non-target compounds cause interferences	Dilute to allow qualitative and quantitative determination of target compounds.
Sample foaming	Dilute until foaming is under control in system.

GC-Hydrocarbon Scan Method

Problems	Solutions
Emulsion forms on extraction	Break emulsion with sodium sulfate addition or centrifuging hexane extract.
Soils with water present and visible	Add anhydrous sodium sulfate prior to extraction.
Major interfering peak(s) on GC scan	Dilute or alter temperature to minimize overlap with gasoline or diesel fuel peaks.

8.0 SAFETY CONSIDERATIONS

THIS SECTION DISCUSSES GENERAL SAFETY CONSIDERATIONS FOR EACH SITE. SPECIFIC ASSIGNMENTS FOR SAFETY AND SITE OPERATING PROCEDURES ARE PRESENTED.

A major concern during hazardous waste site investigations is safety, both for the general public and the site investigators. This section provides a general overview of safety concerns and practices used at the NIKE Site. A more detailed discussion of safety is presented in the NIKE Site Health and Safety Plan (under separate cover).

8.1 Responsibilities

The Site Manager, under the auspices of the LETCO Safety Officer, is responsible for establishing, and adjusting as necessary safety precautions at hazardous waste sites under investigation. It is his responsibility to ensure that work is conducted in compliance with the directions contained in the Health and Safety Plan. The following areas are important aspects of the Safety Plan and under the supervision of the Site Manager:

- Protective Equipment - The Site Manager should ensure that each member of the site investigation team is properly attired according to the level of protection (A,B,C,D or E) established in the Safety Plan.

- Emergency Equipment - The following emergency equipment should be available at hazardous site investigations: first-aid kit, fire extinguisher, and full face respirators. Other equipment on-site, or within easy access, should include shower, communication equipment, extra work uniforms, etc.

- Work Plans - A copy of the site work plans (Sampling and Analysis Plan, Well Installation Plan, and Health and Safety Plan) should be available on-site.

- Emergency Procedures - The Site Manager should be aware of emergency procedures discussed in the Health and Safety Plan. At a minimum, a preliminary safety meeting should be held initially to discuss emergency procedures, such as evacuation, emergency telephone numbers, general first aid, accidents, etc.

- Site Operating Procedures - Prior to initiating investigations on the site, the Site Manager should discuss general site operating procedures including work zone locations on the site, drilling and sampling protocols, decontamination procedures, etc.

8.2 Site Operating Procedures

Environmental (dilute) samples will be collected from media at the NIKE Site. These samples do not require the same safety precautions as hazardous samples would require. However, even environmental samples can contain elevated levels of toxic or hazardous substances. Therefore, general site operating procedures for drilling and sampling at the NIKE Site will include the following:

a. **Level E Protection - Work uniforms will consist of cotton coveralls, steel toe boots, hard hats and neoprene gloves. The following personnel precautions should be observed.**

   1) **No eating or drinking in the vicinity (within 50 feet) of drilling or sampling.**

   2) **Wash hands and face upon leaving the work area and before eating or drinking.**

3) Direct contact with suspected contaminated material (soil, ground water, and surface water) should be avoided.

4) Prescribed drugs should not be taken on the site without medical approval.

5) Alcoholic beverages should not be taken during site investigations.

If warranted by site conditions encountered during drilling or sampling, the protection level will be upgraded to Level D with the concurrence of the LETCO Safety Officer. If more than Level D hazardous conditions are encountered, the Safety Officer will be requested to visit the site personally to supervise safety.

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APPENDIX D

WELL INSTALLATION PLAN

GENERAL WELL INSTALLATION PLAN

CONTRACT DACA87-85-C-0104

Prepared for

Department of the Army
Huntsville Division, Corps of Engineers
P. O. Box 1600
Huntsville, Alabama 35807-4301

Prepared by

Law Environmental Services
Government Services Division
P. O. Box 888013
Atlanta, Georgia 30356

March, 1986

WORK PLAN PREAMBLE

The initial effort described in the following Generic Plans is called the Preliminary Determination Phase (PDP). It is unique in terms of both breadth and complexity as compared with Remedial Investigations (RI) under CERCLA and Confirmation Studies under the IRP. Although many technical requirements apply especially in the Sampling and Analysis area, some latitude is available because of the preliminary nature of this effort.

These PDP studies are designed only to confirm or deny the existence of contamination which could have been caused by DOD, and are not equivalent to RCRA ground water quality assessments, or CERCLA investigations. Only when contamination is discovered is it necessary to follow the much stricter EPA guidance for site investigations.

The Plans are structured so that headings describing the intent of each section are given in **CAPITALIZED BOLD FACE TYPE.** This language would not appear in a site specific plan. In some cases, site specific examples are given. They appear in **Bold Face Regular Type.** The site specific data should be inserted in place of these examples for a specific case. Other suggested language for site specific plans is given in regular type. Where specific equipment is mentioned, "equivalent equipment" that performs the required task in an acceptable manner may be specified and used.

TABLE OF CONTENTS

		Page #
1.0	INTRODUCTION AND BACKGROUND	1
2.0	WELL LOCATIONS AND DEPTHS	2
2.1	Well Locations	2
2.2	Well Depths	3
3.0	OTHER SAMPLING LOCATIONS	4
4.0	DRILLING EQUIPMENT AND MATERIALS	4
4.1	Drilling Rig	4
4.2	Well Casing and Screen Materials	4
4.2.1	Well Casing (Riser)	4
4.2.2	Well Screen	5
4.2.3	Centralizers	5
4.3	Artifical Sand Pack	5
4.4	Bentonite Seal	5
4.5	Grout Mixture	5
4.6	Drilling Fluids	6
4.6.1	Water	6
4.6.2	Drilling Mud	6
4.7	Well Completion Deatils	6
4.7.1	Concrete Pad	6
4.7.2	Steel Security Cap	6
4.7.3	Protective Posts	6
4.7.4	Well Painting	6
5.0	DRILLING PROCEDURES	7
5.1	Initial Activities	7
5.2	Drilling Protocol	7
6.0	WELL INSTALLATION	8
6.1	Hollow Stem Auger Technique	8
6.2	Continuous Flight Augers or Mud Rotary Technique	8
7.0	WELL DEVELOPMENT	9
8.0	IN-SITU PERMEABILITY	10
9.0	WELL SAMPLING	11
10.0	PROJECT ASSIGNMENTS	11

GENERAL
WELL INSTALLATION PLAN
CONTRACT DACA87-85-C-0104

THIS SECTION OF THE WELL INSTALLATION PLAN DISCUSSES THE OBJECTIVES OF MONITORING WELLS AND PROVIDES PRELIMINARY BACKGROUND INFORMATION ON THE SITE. AN EXAMPLE OF TYPICAL SITE SPECIFIC LANGUAGE IS GIVEN. INFORMATION COMPRISING SEVERAL SENTENCES OF SITE LAYOUT INFORMATION ARE INCLUDED IN THE SECTION AS WELL AS SEVERAL PARAGRAPHS OF DATA OBTAINED IN THE SITE INSPECTION TRIP AND INCLUDES INFORMATION ABOUT SITE GEOLOGY, GROUND WATER, TOPOGRAPHY AND PRESENT SITE LOGISTICS. EXAMPLE LANGUAGE THAT IS SITE SPECIFIC IS GIVEN IN BOLD FACE TYPE. EACH PLAN MUST DEVELOP ITS OWN SITE SPECIFIC INFORMATION FOR THIS SECTION.

1.0 INTRODUCTION AND BACKGROUND

Monitoring wells must be installed in a manner to accomplish the following objectives: to collect representative groundwater samples; to prevent contamination of the aquifer by the drilling equipment; to prevent inter-aquifer contamination; and, to prevent vertical seepage of surface water into the monitoring well water-intake zone. This well installation plan discusses the equipment, procedures and personnel that will be utilized at the NIKE Site to accomplish these objectives.

The site was formerly owned by the Department of Defense (DOD) from about 1956 until about 1967. The site contained a total of 86.20 acres, with 28.88 acres "Fee" and 57.20 acres "Easement". The primary tract of interest is the Launcher Area which consisted of 19.11 acres. Facilities at the Launcher Area included officers quarters, missile assembly and test building, a revetted fueling area, three silo areas, and other smaller structures. The IFC Area is located about one mile northeast of the site, but is not being considered in this investigation because of its lack of facilities that would apparently cause contamination. The Launcher Area is presently owned by the City of Needham and has served no use since purchase. It is eventually intended for use for new school facilities.

At other NIKE facilities across the U.S., records indicate the possibility that hazardous/toxic substances may have been released and/or disposed on similar sites. The primary area of concern is generally at the Launcher Area and is related to missile fueling/defueling, operation and maintenance activities, and deactivation of the sites. Therefore, groundwater and soil samples will be taken only at the Launcher Area and analyzed for hazardous constituents (see NIKE Site Sampling and Analysis Plan, under separate cover).

The following sections of this Plan discuss well and soil sampling locations, well depths, drilling equipment and materials, drilling procedures, well development, in-situ permeability testing, well sampling, and project assignments.

2.0 WELL LOCATIONS AND DEPTHS

2.1 Well Locations

As specified in the "Investigation of Former NIKE Missile Sites Throughout CONUS" Statement of Work (SOW) dated July 3, 1985, four ground-water monitoring wells are to be installed at the NIKE Site. The well locations are to be related to previous DOD activities on the site that may have released hazardous/toxic substances.

To better understand existing site conditions, a preliminary site investigation was performed. Agencies presently involved with the site were visited and regional data was obtained. Preliminary data were collected on the general site characteristics to assist in locating the proposed groundwater monitoring wells. Discussions were also conducted with local authorities, owners and others that may have site information who were familiar with the Launcher Area and previous activities at the site. The following data was learned from the preliminary site investigation:

- The geology of Needham has examples of both bedrock and glacial action. The bedrock is primarily volcanic from the Devonian or Carboniferous Age along with some later massive conglomerate sediments and a small region of earlier granodiorite. The glacier features include drumlins, a large lake filled plain, eskers, kettle-holes, erratic boulders and bedrock striation. In addition the course of the Charles River was extensively relocated as a result of the glacial deposits in Needham and surrounding communities.

- Needham lies entirely within the Charles River Watershed and is bordered on three sides by the Charles River. This river frontage totals 12.3 miles, or approximately 15 percent of the total river length. The Charles River is Massachusetts' largest intrastate waterway.

- Topography at the Launcher Area slopes predominantly toward the eastern edge of the facility. Ground water is locally controlled by topography. Significant fill has been placed on the site to achieve construction grade for several of the buildings. Wetlands exist both to the east and northwest of the site.

- From initial information obtained during the site visit, the IFC Area appears to be free from surface contamination. It does not appear that any activities were conducted at the

IFC Area that would have resulted in contaminating the site. Therefore, all subsequent investigations for this study will be focused at the Launcher Area.

- The Launcher Area was purchased by the City of Needham in 1968 for future educational purposes. It has not been developed since that time. Parklands exist adjacent to the site and citizens using the parks occasionally gain access to the site.

- There is evidence that some dumping of refuse and possibly other materials has occurred in the past. It is not known to what extent past NIKE operations may have contributed to such refuse. The sampling program will consider this possibility.

- The site is heavily wooded and minor adjustments to boring locations may be necessary considering field access difficulties.

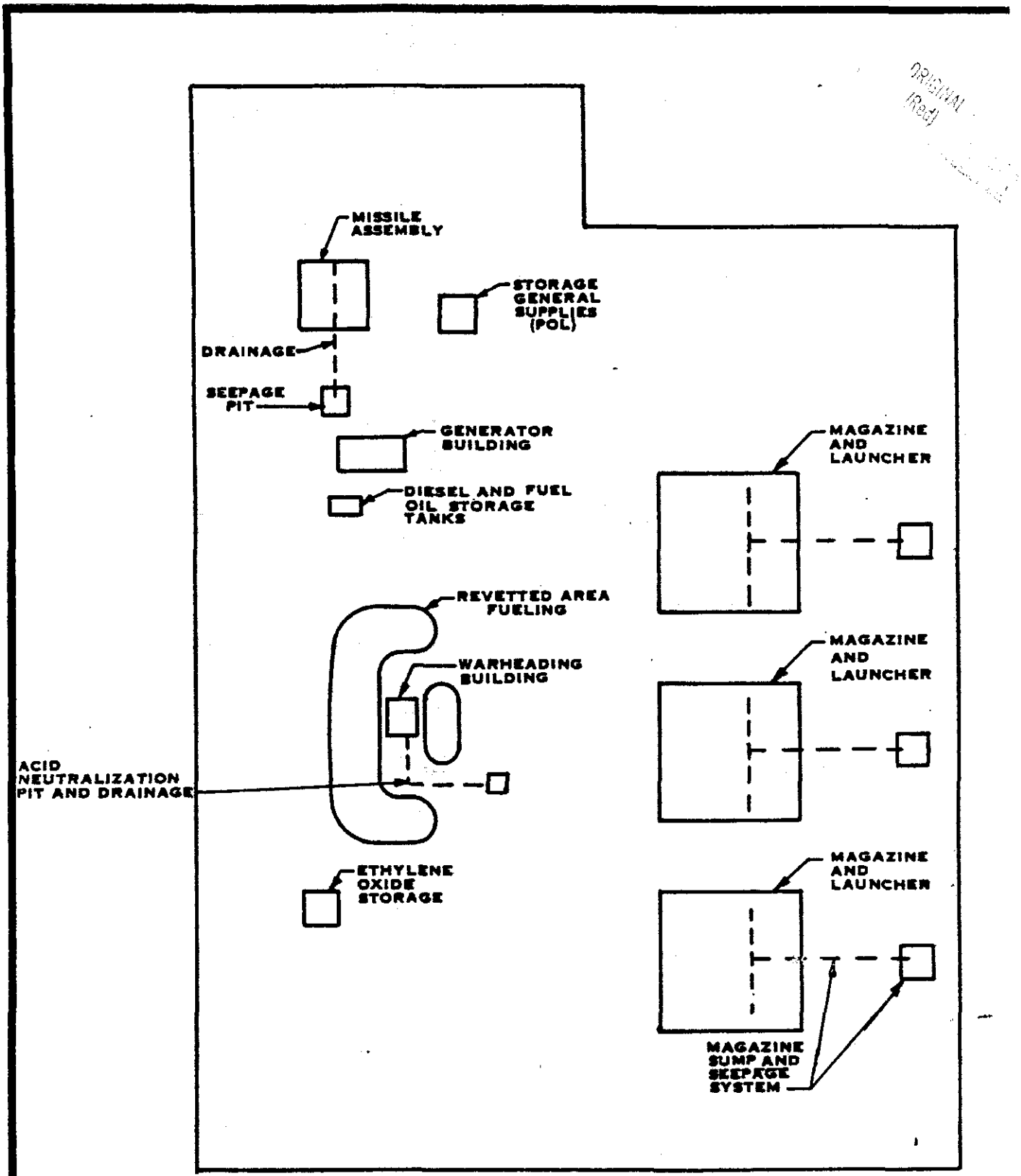
Based upon the information gathered during the initial site visit, the NIKE Site could be monitored in the following manner.

SEVERAL PARAGRAPHS SHOULD BE GIVEN WHICH RELATE TO THE SITE MAP AND EXPLAIN THE RATIONALE FOR THE SAMPLING LOCATIONS. (NO EXAMPLE IS GIVEN TO PROVIDE MAXIMUM LATTITUDE IN DEVELOPING SITE SPECIFIC RECOMMENDATIONS).

2.2 Well Depths

SEVERAL SENTENCES SHOULD BE GIVEN WHICH ESTIMATE MONITORING WELL DEPTHS AND ANY EXTENUATING CIRCUMSTANCES (NO EXAMPLE IS GIVEN).

Procedures for determining well depth in the field will be predicated upon the depth of the water table. During drilling (see following Section 5.2), the borings will be logged continuously. At the first indication of the water table (fully saturated conditions), the depth of the boring will be noted. The water table will be further penetrated a minimum of 10 feet unless rock is encountered. However, no well will exceed a total depth greater than 100 feet without specific concurrence by the Contracting Officer, or his representative.



GENERALIZED NIKE SITE

CONTRACT DACA 87-85-0104

LAW ENVIRONMENTAL SERVICES

MARIETTA, GEORGIA

LAUNCHER AREA

FIGURE

3.0 OTHER SAMPLING LOCATIONS

THIS SECTION OF THE WELL INSTALLATION PLAN DISCUSSES OTHER SAMPLING LOCATIONS (I.E. SOIL, SEDIMENT, ETC.) AT THE SITE.

In addition to the four wells, 12 soil samples will also be obtained from the Launcher Area. Five of the samples will be from the well borings (includes a duplicate sample from one of the wells) and the remaining seven samples will be distributed around the site at the discretion of the site investigation team. Attempts will be made to select the most probable locations for contamination around former DOD areas of activity. The samples will be collected, handled, shipped and analyzed as discussed in the NIKE Site Sampling and Analysis Plan (under separate cover).

4.0 DRILLING EQUIPMENT AND MATERIALS

THIS SECTION DISCUSSES WELL DRILLING EQUIPMENT AND MATERIALS FOR INSTALLING THE MONITORING WELLS AT EACH SITE. SPECIFIC INFORMATION IS PROVIDED FOR THE TYPE OF DRILLING RIG, WELL CASING AND SCREEN, SAND PACK, BENTONITE SEAL, GROUT AND DRILLING FLUIDS.

4.1 Drilling Rig

The NIKE Site monitoring wells will be installed utilizing one of the following drilling techniques:

- Hollow Stem Auger (HSA)
- Continuous Flight Auger (CFA)
- Mud Rotary (MR)

It is acknowledged that the Hollow Stem Auger technique is preferable and will be used if possible.

The drill rigs will install a minimum 7-inch diameter borehole in order to facilitate installation of 2-inch (ID) wells. The drill rig will also have the capability to collect split spoon samples according to ASTM procedures. At a minimum, the rig will be equipped with a cathead operated, 140-pound hammer with a 30-inch draw. The 30-inch draw distance will be marked on the hammer rod. Drill rigs and drill rods will be free from oil and grease, and will be cleaned with live steam prior to initiating drilling on each well.

If rock coring is required it will be conducted according to the ASTM D 2113 procedures for Diamond Core Drilling.

4.2 Well Casing and Screen Materials

4.2.1 Well Casing (Riser)

All monitoring well casing (riser pipe) will consist of new, threaded, flush joint, PVC with a minimum inside diameter of 2 inches. The casing will conform to ASTM-D 1785 Schedule pipe and

inches. The casing will conform to ASTM-D 1785 Schedule pipe and will bear markings that will identify the material as that which is specified. At a minimum the riser pipe will be Schedule 40 or greater. No organic solvents or glue will be used in joining the pipe. Instead, Teflon tape will be wrapped on the threads to facilitate joining and to provide a more adequate seal.

4.2.2 Well Screen

All well screens will consist of new, commercially fabricated, threaded, flush joint 2-inch (I.D.) PVC. Screen slot openings will be pre-manufactured at 0.010 inch (10-slot) and a PVC threaded plug will be provided for the bottom of the well. No organic solvents or glue will be used in joining the screen and casing. Instead Teflon tape will be wrapped on the threads.

4.2.3 Centralizers

Depending upon the type of drilling technique, PVC centralizers may be necessary to maintain the well casing and screen in the center of the boring. Centralizers will not be installed on the screen.

4.3 Artificial Sand Pack

An artificial gravel/sand pack will be installed in the annulus between the boring and the well screen. The sand pack will consist of clean, inert, non-carbonate materials. The sand pack will be placed by manually pouring the sand into the annulus space or with a tremie pipe, if necessary. The sand pack will be placed from the bottom of the boring to approximately 3 feet above the top of the well screen. The following Section 6.0 describes well installation procedures.

4.4 Bentonite Seal

A minimum 2 foot bentonite seal will be installed above the artificial sand pack. The bentonite seal will be tamped, if feasible, wetted, and allowed to swell at least 30 minutes prior to placement of grout.

4.5 Grout Mixture

A sand-cement-bentonite grout mixture will be placed in the annular space between the well casing and boring from the tip of the bentonite seal to the ground surface. The sand/cement mixture will consist of Portland cement (ASTM-C150), and sand (ASTM-C33) with water added in the proportion of 5 to 7 gallons per 94 pound bag of cement. Additionally, 3 percent by weight of bentonite powder may be added to the mixture to help reduce shrinkage.

4.6 Drilling Fluids

4.6.1 Water

Water used to assist drilling operations shall consist of fresh, potable water, and in no manner will a potentially contaminated source of water be used in the drilling operation.

4.6.2 Drilling Mud

In the event that drilling mud is necessary, bentonite is the only drilling fluid additive that will be used. No organic additives will be used. Data on the bentonite will be provided including: brand name, manufacturer, manufacturer's address, product description, and mixing ratios. It is currently anticipated that the wells will be installed without the need for drilling mud or supplemental water.

4.7 Well Completion Details

4.7.1 Concrete Pad

A minimum 3 foot x 3 foot x 4 inch concrete pad will be installed around each of the monitoring wells at the site. The pads can consist of ready-mix concrete mixed in appropriate proportions (i.e. ready-mix and water). The pad should be sloped slightly from the well to the edges of the pad to ameliorate surface run off. A 3 ft. x 3 ft. form should be constructed (out of 2x4 lumber) to pour the form. The form may remain in-place.

4.7.2 Steel Security Cap

A round, or square, steel security cap will be installed over the PVC well stick-up. The security cap should have a hinged locking cap feature. The diameter of the security cap should allow easy access to the PVC well stick-up. It will be installed in concrete pad. Key-alike locks will be provided for each of the wells.

4.7.3 Protective Posts

Protective Posts consisting of nominal 2 inch diameter steel posts shall be placed at each corner of the concrete pad and to a sufficient height to protect the PVC well pipe from being damaged.

4.7.4 Well Painting

The steel security cap will be painted with a bright, (yellow or orange) rust-inhibiting paint (i.e., Krylon, or equal) to prevent corrosion.

5.0 DRILLING PROCEDURES

THIS SECTION DISCUSSES THE WELL DRILLING PROTOCOL AT EACH SITE. A FIGURE ILLUSTRATING A TYPICAL WELL LOG IS PROVIDED FOR EACH SITE.

5.1 Initial Activities

Prior to setting up the drilling rig on a monitoring well location, the site will be checked with appropriate authorities for underground utilities. Drilling will only proceed where no service lines are near the well locations.

5.2 Drilling Protocol

After the initial site survey, the drill rig will be set up on the selected location. Once the drill rig is in position, the following protocol will be followed for each well:

- Collect split spoon sample (ASTM-D 1586 67) from the ground surface to 1.5 feet using standard penetration procedures, i.e., 140 pound weight falling 30 inches to drive 1.375 inch I.D., 2 inch O.D., split barrel sampler.

- Begin augering, or drilling, and collect split spoon samples continuously down to 10 feet then every 5 feet, i.e., 14-15.5 feet, 19-20.5 feet, etc., or at changes in strata.

- A soil test boring log will be completed during drilling by a qualified geologist, or geotechnical engineer. It will be similar to the log shown in Figure 2 and will record the following data:

  - Sample number and depth
  - Standard penetration test blow counts per 6 inch advance
  - Percentage recovered
  - Soil classification, color, consistency or density, and moisture content
  - Depth of boring
  - Boring refusal
  - Water table depth
  - Water losses, if applicable
  - Method of advancing boring

- Soil samples will be collected from each split barrel sample, stored in glass jars, and labeled. The samples will be delivered to a laboratory for analysis of grain size, moisture content, and Atterberg limits.

- The depth of first encountered free water will be indicated on the drilling log. Drilling will continue into the saturated zone approximately 10 feet at which point the boring will be terminated and the well will be installed.

FIGURE 8

LAW ENGINEERING TESTING CO. - SOIL TEST BORING FIELD REPORT

BORING NO. _____

JOB NO. _____ DRILLER _____ GROUND SURFACE ELEV. _____

JOB NAME _____ CREW _____ HOURS MOVING _____

DATE: _____ WEATHER _____ PAGE _____ OF _____

SAMPLING					SCALE	UD	REC	SOIL CLASSIFICATION	REMARKS
No.	Depth	"N" 1ST 6"	2ND 6"	3RD 6"					
					0				
					5				
					0				
					5				
					0				
					5				
					0				
					5				

+STANDARD PENETRATION RESISTANCE IS SUM OF BLOWS FOR 2ND 6" AND 3RD 6" TO DRIVE 1-3/8" I.D., 2" O.D.

BORING TERMINATED: _____

BORING REFUSAL: _____

WATER TOB DEPTH _____

WATER 24 HR.: DEPTH _____

WATER LOSSES _____

METHOD OF ADVANCING BORING	DEPTH
POWER AUGER SOLID	TO
HAND CHOP: W/MUD: W/WATER	TO
ROTARY DRILL: W/MUD: W/WATER	TO
DIAMOND CORE	TO

Once the boring is completed, a well will be installed as soon as practical, but no later than within 24 hours. Measures will be taken to protect the integrity of the well during any interim periods.

In the event that a boring should prove to be unusable for any reason, it will be grouted from the base to the land surface.

6.0 WELL INSTALLATION

THIS SECTION DISCUSSES THE WELL INSTALLATION PROTOCOL AT EACH SITE. A FIGURE SHOWING A TYPICAL MONITORING WELL IS PROVIDED WITH EACH SITE PLAN.

Installation of the well casing and screen can differ slightly depending upon the drilling technique utilized in advancing the boring. The following sections discuss well installation using either a Hollow Stem Auger (HSA) technique, or Continuous Flight Auger (CFA) or Mud Rotary (MR) techniques.

6.1 Hollow Stem Auger Technique

When a boring is advanced using Hollow Stem Augers, the following protocol will be followed to install the well casing and screen:

- install approximately 15 feet of 2-inch (I.D.), threaded flush jointed, pre-manufactured well screen in the outer drill pipe (individual joint threads will be wrapped with Teflon tape).
- install solid riser PVC to ground surface plus 24-30 inch stick-up.
- remove one auger flight (5 feet) and install artificial sand pack through annular opening between auger and well casing. Water will be used to prevent bridging of the sand in the annulus.
- continue removing augers and installing sand pack until at least 3 feet above the top of the well screen.
- remove remaining augers and install minimum 2-foot bentonite seal.
- grout boring annulus to land surface with grout/bentonite mixture, previously described. Install steel security cap, concrete pad and posts. The grout shall be allowed to set a minimum of 24 hours before developing the wells.

6.2 Continuous Flight Augers or Mud Rotary Technique

Well installation procedures for Continuous Flight Augers or Mud Rotary drilling will be similar to the Hollow Stem Auger procedure with the following exception:

- after termination of boring, all drilling rods will be removed and the 2-inch PVC well will be installed with centralizers. The centralizers will maintain the well in the center of the boring for installation of the sand pack, bentonite seal and grout. If the boring collapses, it will be re-drilled to the proper depth prior to well installation. The sand pack will be installed with a tremie pipe from the bottom of the boring.

- continue installing sand pack until at least 3 feet above the top of the well screen.

- install minimum 2-foot bentonite seal.

- grout boring annulus to land surface with grout/bentonite mixture, previously described. Install steel security cap, concrete pad and posts. The grout shall be allowed to set a minimum of 24 hours before developing the wells.

A typical water quality monitoring well is shown in Figure 3. This type diagram will be completed for each of the 4 wells at the NIKE Site. Each well diagram will provide the following data:

- total well depth
- depth of well screen
- depth to top of sand pack
- thickness of bentonite seal
- depth to base of grout seal
- water table elevation
- well stick-up

7.0 WELL DEVELOPMENT

THIS SECTION DISCUSSES THE WELL DEVELOPMENT PROCEDURES FOR EACH OF THE WELLS ON EACH SITE. WELL DEVELOPMENT FORMS ARE PROVIDED TO RECORD PERTINENT DATA.

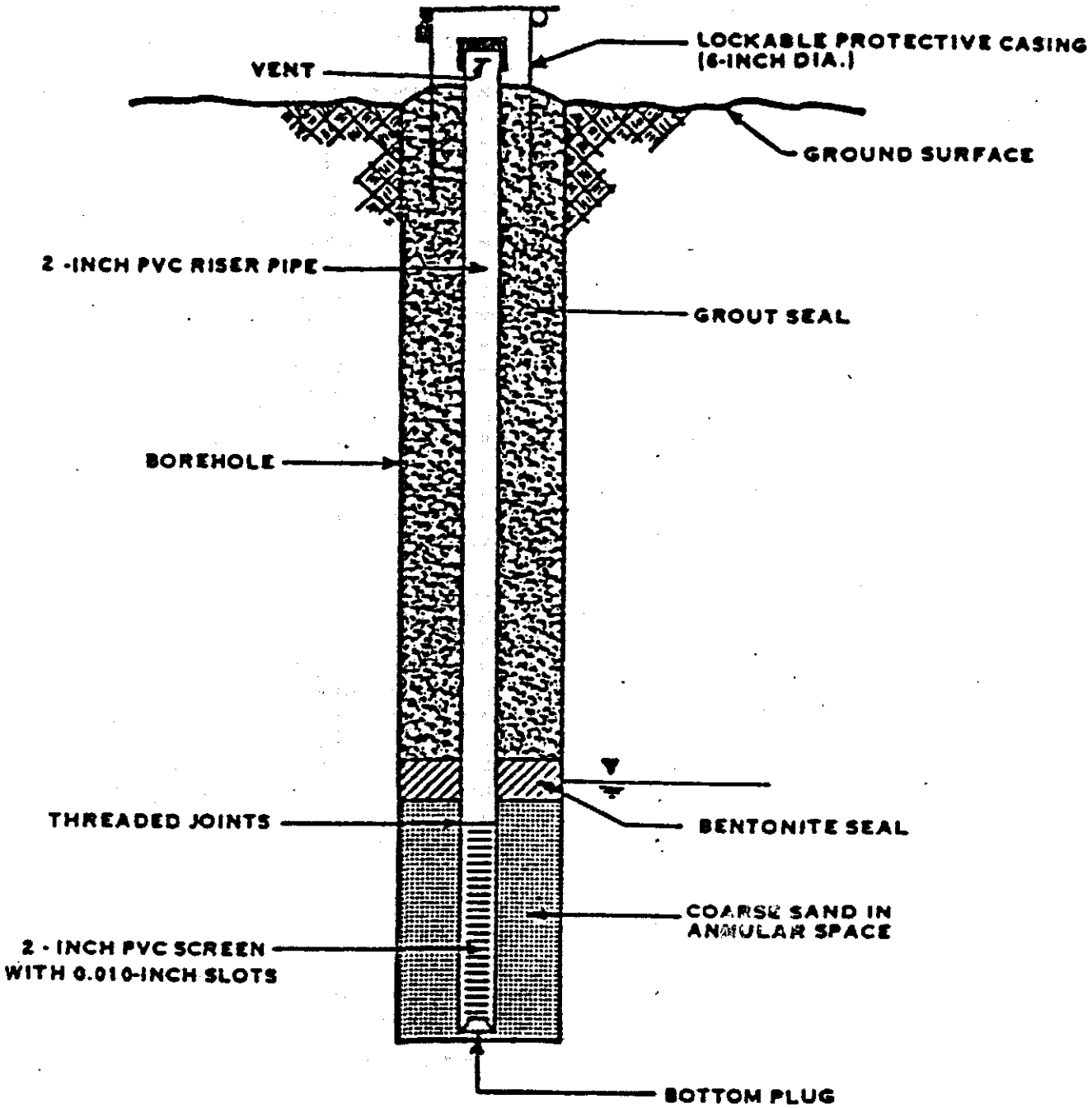
The development of the 4 wells at the NIKE Site will be performed as soon as practical after well installation, but no sooner than 24 to 48 hours after placement of the internal grout collar. Development protocol will be as follows:

- measure static water level of well

- measure total well depth

- remove a minimum of 5 well volumes using compressed air technique, or manually

- collect water sample initially, twice during development and at the end of development, and perform field measurement of specific conductance, pH and temperature



(NOT TO SCALE)

NIKE SITE CONTRACT DACA 87-83-C-0103	LAW ENGINEERING TESTING COMPANY MARIETTA, GEORGIA	SCHEMATIC OF A TYPE II WATER QUALITY MONITORING WELL FIGURE 3

- denote physical characteristics of water throughout well development (color, odor, turbidity, etc.)
- record the total quantity of water removed
- measure static water level
- measure total well depth

Well development will continue at least 4 hours and until the following conditions are met: well water is reasonably clear; sediment thickness remaining in the well is less than 5 percent of the saturated screen length; and, at least 5 well volumes (including saturated annulus sand pack, 30% porosity) have been removed.

Well development data will be recorded on a form similar to Figure 4.

8.0 IN-SITU PERMEABILITY

To determine in-situ permeability (hydraulic conductivity), a slug test will be performed on each well. The following protocol will be followed:

- measure static water level
- introduce or remove a slug of known volume
- record the fall or rise of the water level with time

The data are then plotted on semi-logarithmic paper and should form a straight line. The following formula is utilized to calculate hydraulic conductivity (K):

$$K = \frac{r_c^2 \ \ln \ (R_e/r_w)}{2 \ L_e} \ \frac{1}{t} \ \ln \ \frac{y_o}{y_t}$$

Where r_c - well radius

R_e - effective radial distance over which the head difference is dissipated

r_w - radial distance between well center and undisturbed aquifer

L_e - height of saturated screen

y_o - y at time zero

y_t - y at time t

t - time since y_o

(after Bower, 1978)

FIGURE 6

LAW ENGINEERING TESTING COMPANY JOB NAME _____ JOB NO. _____

BY _____ DATE _____ CK _____ DATE _____ SHEET ____ OF ____

WELL DEVELOPMENT DATA

1. Well No. _____
2. Date of Installation: _____
3. Date of Development: _____
4. Static Water Level: Before Dev. _____ ft.; 24 Hours After _____ ft.
5. Quantity of Water Loss During Drilling, If Used _____ Gal.
6. Quantity of Standing Water in Well and Annulus Before Dev. _____ Gal.

	Start	During	End
7. Specific Conductance (umhos/cm)	_____	_____, _____	_____
Temperature (c°)	_____	_____, _____	_____
PH (s.u.)	_____	_____, _____	_____

8. Depth From Top of Well Casing to Bottom of Well _____ ft.
9. Screen Length _____ ft.
10. Depth to Top of Sediment: Before Dev. _____ ft.; After Dev. _____ ft.
11. Physical Character of Water: _____
12. Type and Size of Well Development Equipment: _____
13. Description of Surge Technique, If Used: _____
14. Height of Well Casing Above Ground Surface: _____ ft.
15. Quantity of Water Removed: _____ Gal.

    Time for Removal: _____ Hr./Min.
16. 1-Pint Water Sample Collected: _____ (Time)

*Development Conditions:
1) Well Water is Reasonably Clear
2) Sediment Thickness < 5% of Screen Length
3) Removal of 5 Well Volumes, Including Saturated Filter Annulus

9.0 WELL SAMPLING

GROUND-WATER SAMPLING PROCEDURES ARE DISCUSSED SEPARATELY IN THE SAMPLING AND ANALYSIS PLAN.

Groundwater sampling procedures are discussed in the NIKE Site Sampling and Analysis Plan (under separate cover).

10.0 PROJECT ASSIGNMENTS

THIS SECTION DISCUSSES PROJECT ASSIGNMENTS DURING WELL DRILLING AND INSTALLATION.

A geologist, or geotechnical engineer, shall be present at each operating drill rig and be responsible for the logging of samples, monitoring of drilling operations, recording of water losses/gains and groundwater data, preparing the boring logs and well diagrams, and recording the well installation procedures of each rig. Each geologist, or geotechnical engineer will only be responsible for one operating rig. The geologist, or engineer, will have on-site QA/QC and safety responsibility and each will have a copy of the Site Safety Plan and Well Installation Plan. The geologist/geotechnical engineer will report directly to the Project Manager.

APPENDIX E

HEALTH AND SAFETY PLAN

GENERAL

HEALTH AND SAFETY PLAN

CONTRACT DACA87-85-C-0104

Prepared for:

Department of the Army
Huntsville Division, Corps of Engineers
P. O. Box 1600
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Government Services Division
P. O. Box 888013
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March, 1986

WORK PLAN PREAMBLE

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CONTENTS

Page

1. INTRODUCTION 1

2. FIELD IMPLEMENTATION OF HEALTH & SAFETY PLAN 3

2.1 Personal Protective Equipment 4

2.1.1 Well Installation, Soil Borings, Water Samples 4
2.1.2 Sediment Sampling 5

2.2 Monitoring 5

3. RESPONSIBILITIES 6

4. PERSONNEL TRAINING 7

5. PERSONAL PROTECTIVE EQUIPMENT 11

5.1 Levels of Protection 11
5.2 Emergency Equipment 11

5.2.1 Fire Extinguishers 12
5.2.2 First Aid Kits 12
5.2.3 Eye Wash 12
5.2.4 Communications 12
5.2.5 Emergency Shower 13

6. SITE OPERATING PROCEDURES 14

6.1 Initial Site Surveillance 14
6.2 Work Zones 14
6.3 Standard Operating Procedures 15

6.3.1 Prior to Leaving Field Office 17
6.3.2 Before Entering Site 19
6.3.3 Sampling 21

6.4 Decontamination Procedures 21

6.4.1 Initial Decontamination 22
6.4.2 Decontamination Procedures 22
6.4.3 Decon Solutions 24

CONTENTS (Cont'd)

Page

7. EMERGENCY PROCEDURES 25

7.1 Emergency Telephone Numbers 25
7.2 Hospital 25
7.3 Accidents/Injuries 26
7.4 Fire 27
7.5 Explosion 27
7.6 Site Evacuation 27

7.6.1 Stages of Evacuation 27

7.7 Safety of Third Parties 28

8. MEDICAL MONITORING PROGRAM 30

8.1 Initial Examination 30
8.2 Quarterly Examinations 32
8.3 Annual Examination 33
8.4 Special Parameters 33

TABLE 8-1 STANDARD BIOMEDICAL MONITORING 34

APPENDIX A - SITE SPECIFIC PLAN 35

APPENDIX B - PERSONAL PROTECTIVE EQUIPMENT 41

APPENDIX C - MEDICAL FORMS 46

1. INTRODUCTION

THIS SECTION DISCUSSES THE BASIC FRAMEWORK OF THE HEALTH AND SAFETY PLAN AND PROVIDES A BRIEF DESCRIPTION OF THE CONTENTS OF THE PLAN AND BACKGROUND INFORMATION REGARDING THE SITE. PARAGRAPHS IN BOLD FACE GIVE A SPECIFIC EXAMPLE OF HOW THE SITE INSPECTION GENERATES PRELIMINARY FINDINGS REGARDING THE INITIAL LEVEL OF SITE SAFETY REQUIREMENTS. A COMPLETED COPY OF APPENDIX A IS ATTACHED AS AN EXAMPLE

The health and safety of site workers and the public is a primary concern and goal during hazardous materials investigations. Thus, a comprehensive, carefully managed, and thoroughly documented health and safety plan is crucial for successful project completion.

The following general plan describes specific responsibilities, training requirements, protective equipment, and general site operating procedures that will be adapted to meet site-specific requirements. Its flexibility allows unanticipated site-specific problems to be addressed while assuring adequate and suitable worker protection. The site specific plan based on an initial site inspection is attached as Appendix A.

General sections dealing with protective equipment, site operating procedures, and emergency responses are also included, along with other information such as respirator maintenance, etc., and will be given to each site worker as a field reference manual.

Based on a preliminary site inspection trip, there is presently minimal evidence of hazardous conditions that would require significant precautions in the inspection, sampling, and well drilling phases of the NIKE Site project. Accordingly, we plan to begin initial site activities using Level E equipment. Based

on this trip, the site specific Health and Safety Plan (Appendix A) has been completed and is attached. It is intended, that the complete Health and Safety Plan will be distributed and discussed with all site personnel. This is necessary so that there will be sufficient awareness of the potential of hazardous conditions. Further, this provides for the proper advance preparation and knowledge of the proper procedures that should be followed, if hazardous conditions are encountered.

If explosive contamination or unexploded ordnance is discovered at any time during the confirmation study operations at the site, the location will be marked, operations in the affected area will immediately be stopped, and the Contracting Officer will be notified.

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ORIGINAL (Red)

2. FIELD IMPLEMENTATION OF HEALTH AND SAFETY PLAN

THIS SECTION DISCUSSES FIELD IMPLEMENTATION OF THE HEALTH AND SAFETY PLAN. DISCUSSIONS ARE GENERAL RATHER THAN SPECIFIC, ALTHOUGH SOME EXAMPLE MATERIAL IS GIVEN. REFERENCE IS MADE TO APPENDIX A OF THE PLAN. THIS APPENDIX PROVIDES SITE SPECIFIC INFORMATION FOR EACH SITE.

Prior to beginning site operations, the Project Manager performed a site reconnaissance to verify that current conditions are as described in previous reports and investigations. The primary purpose of this reconnaissance was to determine airborne organic vapor levels, and to finalize all planning and logistics for site work.

Based on the information received about site conditions, it is anticipated that the site reconnaissance will be performed with EPA level E personnel protection. Higher levels of protection equipment will be available if necessary.

A written, site-specific health and safety plan (see Appendix A) was developed after the reconnaissance, and will be distributed to site workers, and explained through training and on-site briefings. The plan covers all phases of operations at the NIKE site, including:

- Work practices
- Hazard identification and assessment
- Established work zones
- Level of personnel protective equipment required in each zone
- Sampling procedures
- Entry and exit routes
- Decontamination procedures
- Accident/emergency response

2.1 PERSONAL PROTECTIVE EQUIPMENT

Based on experience at similar sites, it appears that the primary exposure will be through physical contact or through inhalation while handling potentially contaminated samples. It seems appropriate, therefore, to specify protective measures based on the work activity, rather than requiring a site-wide level of protection.

It is well established that worker safety and efficiency decrease in direct proportion to the amount of protective gear required. Thus, it is always desirable to use as little equipment as possible which provides adequate protection. Anything less than maximum protection (levels A or B) cannot be specified, however, without carefully defining site conditions, allowing extra safety margins, having higher level equipment readily available, and anticipating worst-case conditions. **Based on these criteria, and the results of our site inspection, we have chosen to use level E protection for various site activities consistent with EPA protocols, the provisions of OSHA (29 CFR 1910 & 1926) and EM 385-1-1, U.S. Army Corps of Engineers Safety and Health Requirements Manual.** In the event of conflicting requirements, the most restrictive shall apply. It cannot be emphasized too strongly that these requirements are subject to change at any time by the Health and Safety Officer based on contaminant monitoring, visual observations, or changes in work or site conditions.

2.1.1 Well Installation, Soil Borings, Water Samples

The primary concern is physical contact with contaminated soil or water, although frequent OVA measurements (and explosimeter readings, if indicated) will be made. Respiratory protection equipment will be readily available.

Required gear at the work site includes:

- Distinct field work clothes
- Polylaminated Tyvek coveralls (readily available)
- Steel toed boots and gloves (chemical resistant)
- Safety glasses or goggles (readily available)
- Hardhat
- Air-purifying respirator (readily available)
- Fire extinguisher (readily available)
- First aid kit (readily available)
- Emergency oxygen (readily available)

2.1.2 Sediment Sampling (not applicable)

2.2 MONITORING

Extensive monitoring will be conducted with an organic vapor detector. If breathing zone readings of greater than 5 ppm over background are obtained, the situation will be evaluated to determine the need and/or adequacy of air-purifying respirators. We will maintain sufficient equipment on-site to immediately address increased contaminant levels and upgrade personal protection if necessary. An explosimeter will be used to check for explosive atmospheres in the bore holes. We also will use other monitoring procedures if warranted by site conditions, such as oxygen deficiency meters, hydrogen sulfide detectors, and detector tube sampling.

Workers will continually be observed (through the buddy system and by on-site managers) for signs of heat stress and other adverse health effects.

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3. RESPONSIBILITIES

THIS SECTION DISCUSSES GENERAL PROJECT RESPONSIBILITIES FOR ENFORCING THE HEALTH AND SAFETY PLAN.

The Project Manager, Site Manager, and Health and Safety Officer are responsible for formulating and enforcing health and safety requirements. These responsibilities include:

- Assuring that all site team members have received the required health and safety training

- Assuring that all team members have completed the required medical examination and have met the qualification criteria for site work

- Assuring that all equipment used on site is suitable and adequate

- Addressing any unusual problems or conditions that may be encountered

- Assuring that site standard operating procedures are followed at all times

The Site Manager has direct responsibility for administering the Health and Safety Plan relative to all site activities and will be in the field full time while site activities are in progress. The Project Manager has general overview responsibility for the success of the Project and may make occasional site visits during field operations. The Health and Safety Officer has responsibility for approving the Health and Safety Plan and responding to any non routine matters that relate to Health and Safety during the Project life.

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4. PERSONNEL TRAINING

THIS SECTION DISCUSSES BASIC PERSONNEL TRAINING AND PROVIDES THE OUTLINE FOR A TYPICAL TRAINING COURSE.

A thorough understanding of the types of hazards most likely to be encountered at hazardous waste sites and personal protection measures needed to protect personnel from them are the first requirements of a complete health and safety plan. Each project team member participates in continuous comprehensive training courses. Additional briefings will be held as necessary to explain and discuss site-specific health and safety matters.

All subcontractors (e.g., drillers, excavators) will be required to complete health and safety training and have documentation of same prior to authorizing their access to the site. A list of safety equipment intended for use by each subcontractor, and written certification that appropriate training has been provided to the personnel scheduled for site work, will be reviewed by the Health and Safety Officer and kept on file. Deficiencies in subcontractor plans will be resolved before authorization to proceed is granted.

An outline of a typical comprehensive training course follows. All topics may not be covered if not applicable to a project.

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ORIGINAL (Red)

HEALTH AND SAFETY PROCEDURES
AT
HAZARDOUS WASTE SITES

I HEALTH AND SAFETY

A. Introduction/Background
B. Attitude and Behavior
C. General Safety Practices

1. Overview of personnel protection equipment
2. EPA levels of protection
3. Procedures for site investigation

a. Planning before departure
b. At the site
c. Decontamination and site exit

4. Environmental monitoring equipment

a. Detector tubes (Draeger)
b. Organic vapor analyzers (OVA, HNu)

D. General Occupational Health

1. Common classes of chemicals
2. Exposure routes
3. Physical, chemical properties, toxicity
4. Medical monitoring
5. Pulmonary function tests

E. DOT Labeling Regulations
F. Safety Regulations

II PERSONAL PROTECTION

A. EPA Levels of Protection

1. Selection criteria
2. Equipment

B. Respiratory Protection

1. Types of respirators
2. Fit testing
3. Cartridge selection
4. Cleaning, maintenance, storage

C. Protective Clothing

1. Types, materials
2. Selection
3. Protection from various chemicals

D. Self-contained Breathing Apparatus

III RESPIRATOR FIT TESTING

A. Qualitative Fit Testing of Employees

1. Personal safety data sheets
2. Cleaning, repairing, maintenance

IV EQUIPMENT DEMONSTRATION AND PRACTICE SESSIONS

A. Draeger Detector Tube Sampling
B. Organic Vapor Analyzers
C. Biomarine, Scott SCBAs
D. Protective Clothing

V HAZARDOUS WASTE FUNDAMENTALS

A. Determination of a Hazardous Waste
B. Labeling, Manifests, Placarding
C. Proper Shipping Names, Transportation
D. Material Safety Data Sheets

VI QA/QC CONSIDERATIONS

A. Requirements
B. Standard Forms
C. Chain of Custody

VII SITE OPERATIONS

A. Work Zones
B. Sampling Techniques
C. Equipment Decontamination
D. Sample Handling

VIII REVIEW OF SITE-SPECIFIC STANDARD OPERATION PROCEDURES

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5. PERSONAL PROTECTIVE EQUIPMENT

THIS SECTION PROVIDES A GENERIC DISCUSSION ON PERSONNEL PROTECTIVE EQUIPMENT. LEVELS OF PROTECTION AND EMERGENCY EQUIPMENT ARE PRESENTED AND REFERENCE IS MADE TO PROTECTIVE EQUIPMENT AND SELECTION CRITERIA IN APPENDIX B. SITE SPECIFIC DATA ARE PRESENTED IN APPENDIX A.

5.1 LEVELS OF PROTECTION

Personal protective equipment selection is based on EPA Levels of Protection as defined in Standard Operating Safety Guides (November, 1984), but we have further defined the protection levels to provide an additional level of protection between EPA levels C and D. The required protective equipment and selection criteria are summarized in Appendix B.

In addition, specialty and reserve equipment will be issued to each team, as necessary, including:

- First aid kit (approved by consulting physician in accordance with 29 CFR 1910.151)
- Emergency oxygen (or escape unit)
- Additional boots, gloves, hardhats, suits, respirators
- Two-way radio communication
- Field manual (site operating procedures)
- Fire extinguisher
- Portable eyewash (as appropriate) and sufficient potable water for copious flushing

5.2 EMERGENCY EQUIPMENT

(As needed based on site conditions)

5.2.1 Fire Extinguishers

Because of the potential threat of fire at many hazardous waste sites during initial remedial measures, fire extinguishers will be readily available and at hand throughout the investigation. All fire extinguishers will be Class ABC. One fire extinguisher will be kept with the field crew during any subsurface activity such as drilling or backhoe excavations, one will remain in the decontamination area, and one will be placed in all vehicles.

5.2.2 First Aid Kits

An industrial first aid kit with sufficient supplies for 10 people will be kept in the decontamination area. Smaller first aid kits will be kept in clean areas and with field crews. At least one individual at the site will be trained and certified in First Aid and CPR.

5.2.3 Eye Wash

An eye wash station (meeting the minimum requirements of ANSI 2358.1) will be maintained at the decontamination zone and portable eyewash stations (as appropriate) will also be kept with field crews.

5.2.4 Communications

A telephone will be installed whenever long-term investigations require the use of a field office trailer. Emergency telephone numbers will be posted at the telephone, outside of the trailer, and be included in each team member's field manual. As a minimum, the Site Manager and one individual in each work zone will be provided with a radio for field communications.

5.2.5 Emergency Shower

If required by site contaminants and conditions, an emergency shower (meeting the minimum requirements of ANSI 2358.1) will be located either outside the decontamination trailer, in the decontamination area, or other suitable location. Otherwise, end-of-day showers will be required. End-of-day showers will occur at each individual's temporary field residence.

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6. SITE OPERATING PROCEDURES

THIS SECTION PROVIDES A GENERIC DISCUSSION OF SITE OPERATING PROCEDURES INCLUDING INITIAL SITE SURVEILLANCE, WORK ZONES, SITE STANDARD OPERATING PROCEDURES, AND DECONTAMINATION PROCEDURES.

6.1 INITIAL SITE SURVEILLANCE

Prior to beginning site operations, the Site Manager and/or the Health and Safety Officer will perform a site reconnaissance to verify that current conditions on site are similar to the description provided in previous investigations. Included in this effort will be atmospheric monitoring of total vapor/gas concentrations, and becoming familiar with the locations of residences, sampling and well sites, work zones, etc. The atmospheric sampling performed at this time should verify conditions reported and, depending on these results, the necessary monitoring that will be conducted during field operations, in accordance with the particular site needs. Typical analyses include airborne particulates, organic vapors, combustible gases, and oxygen. **(This section should also include a brief description of the results of the site inspection which leads to the completion of Appendix A. No example is given.)**

6.2 WORK ZONES

A hazardous waste site is usually divided into three specific zones: Zone 1 - exclusion zone; Zone 2 - contamination reduction zone; and Zone 3 - support zone. These three zones are established on the basis of contamination potential.

The exclusion zone is the area of greatest environmental contamination and presents the greatest potential for worker exposure. Personnel entering the area must wear the previously mandated level of protection. In certain instances, different

levels of protection will be required depending on the tasks to be completed.

The contamination reduction zone acts as a transition between "hot spots" and clean areas. The support zone serves as a clean, control area, and decontamination facilities end here. All areas will be defined and marked as appropriate for the particular site.

6.3 SITE STANDARD OPERATING PROCEDURES

The following items are requirements to protect the health and safety of field workers and will be included in the field manual. Depending on site-specific conditions, items may be added or deleted.

- The buddy system will be used. Hand signals will be established.

- During site operations, each worker should consider himself as a safety backup to his partner. Offsite personnel provide emergency assistance. All personnel should be aware of dangerous situations that may develop.

- Visual contact must be maintained between buddies onsite.

- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in any area designated as contaminated.

- Prescription drugs should not be taken by personnel where the potential for contact with toxic substances exist, unless specifically approved by a qualified physician. Alcoholic beverage intake is prohibited during the work day.

- No excessive facial hair which interferes with the satisfactory fit of respiratory protection is allowed on personnel required to wear such equipment. Each staff member must pass the fit-testing for respirators.

- Contact lenses will not be permitted at the site.

- Disposable clothing will be used whenever possible to minimize the risk of cross-contamination.

- The number of personnel and amount of equipment in any contaminated area should be minimized, but allow for effective site operations.

- Work areas for various operational activities (equipment testing, decontamination) will be established.

- Procedures for leaving any contaminated area will be planned and reviewed prior to going onsite.

- Work areas and decontamination procedures will be established based on prevailing site conditions and are subject to change.

- Wind indicators will be strategically located onsite.

- Contact with contaminated or potentially contaminated surfaces should be avoided. Whenever possible, do not walk through puddles, mud, or any discolored ground surface; do not kneel on the ground, lean, sit, or place equipment on drums, containers, vehicles, or on the ground.

- No personnel will be admitted to the site without the proper safety equipment.

ORIGINAL (Red)

- Proper decontamination procedures must be followed before leaving the site.

- All personnel must comply with established safety procedures. Any staff member who does not comply with safety policy, as established by the Health and Safety Officer or the Project Manager, will be immediately dismissed from the site.

- Any medical emergency supercedes routine safety requirements.

- No street clothes will be worn at the site. At a minimum, a separate distinct set of work clothes will be worn.

6.3.1 Prior to Leaving Field Office

- Review site information (see Site Manager).

  - Expected hazards
  - Special conditions
  - Sampling procedures
  - Location of showers and telephones
  - Emergency medical information
  - Level of personnel protection required

- Check safety gear and equipment. The following equipment is available for issue, depending on site-specific conditions.

  - Steel-toe safety boots
  - Rubber boots
  - Coveralls, Tyvek, Saran, etc.
  - Hardhat with strap
  - Faceshield
  - Goggles

- VITON inner gloves
- Half-face (or full-face) respirator with appropriate cartridges and prefilters
- SCBAs
- Nylon backpack for gear sampling equipment
- Ziplock(R) baggies, quart and gallon size, to keep spare equipment clean
- Belt
- Belt pack for respirator
- Belt pack with personal first aid kit containing: (First aid kit will be approved by consulting physician in accordance with 29 CFR 1910.151)

  * can of spray-on bandage
  * bottle of vegetable oil (for PCB/oil irritation on eye contact)
  * knuckle bandages
  * ammonia inhalant
  * sting relief packet
  * isopropyl alcohol pads
  * snake bite kit (optional)
  * roll of 1/2 in. adhesive tape
  * finger tip bandages
  * instant ice pack
  * emergency compress
  * poison ivy wash
  * insect repellent (seasonal)

- Field standard operating procedures

. Backup equipment and spares will be maintained at the field office:

- Extra suits and gloves
- First aid kits
- Respirators with cartridges and prefilters
- Portable emergency oxygen unit
- Other self-contained breathing apparatus
- Communication devices
- Duct tape

- Trash barrel for return transportation of contaminated gear and equipment
- Salt replacement drinks (GATORADE)
- Safety harness and lines (if necessary)

6.3.2 Before Entering Site

- No eating/drinking/smoking while suited up. Exception: Gatorade. When getting Gatorade, clean your gloves, etc.

- Drink some Gatorade.

- Place sample containers in field sample carrier (backpacks or carrier).

- Check location of showers/lavatory/water supply and telephones.

- Lay out and check alternate safety gear.

  - Oxygen masks
  - First aid kit
  - Extra clothing

- Don required safety gear in order.

  - Suit
  - Boots
  - VITON inner gloves
  - Neoprene and/or other synthetic outer gloves
  - Tape neoprene gloves to suit sleeves
  - Get long sleeve gloves if collecting soil samples, etc.

  If suit has long enough legs, gather excess material at top of boot and tape the cuff over the top of the boot. If wet

conditions prevail and no cuff can be formed, either connect the suit and boots with tape or cut off excess suit and tape suit on outside of boots.

Remember: Suits are splashproof, not completely waterproof.

- Respirator (test even if you are not going to wear it immediately). (See attached fitting instructions)
- Hardhat with integral goggles and face shield.

Put hardhat on and use the chin strap. Especially when well pumping, use <u>both</u> the face shield <u>and</u> the goggles. The face shield is meant to break impact of liquids and solid objects. <u>Only</u> the goggles, however, are splash proof.

. Check gear for rips/tears/malfunctions.

. Set up buddy prior to proceeding.

. Check your buddy's equipment and have him check yours.

. Preliminary site survey.

- Characterize physical conditions of site
- Use as much <u>excess</u> caution as possible
- Use sampling gear (such as long handled dippers for sampling holes/pipes/gaps/tanks/trunks/manhole)

. Use caution - go slowly.

. If any problems with gear or equipment arise, exit by <u>same</u> route as you entered .... <u>NO SHORTCUTS</u>

. On return, have buddy check for external contamination. Check gear for damage.

6.3.3 Sampling

- No eating/drinking/smoking while sampling.

- Use standard sampling techniques (see field manual or site manager).

- Use excessive care in handling samples. If the sampling site is not accessible using your gear (i.e., water too high, slippery, steeply sloped, holes, etc.), don't take a sample. Confer with buddy and team leader about alternate sampling site.

- Wipe off spills, dirt, and residue immediately.

- If any gear or equipment damage develops, immediately repair or replace.

- If you experience any physical discomfort, abnormalities, or lightheadedness - stop work, tell your buddy, and go back.

- Always go back by the SAME ROUTE as you came.

6.4 DECONTAMINATION PROCEDURES

All personnel must complete appropriate decontamination procedures prior to leaving the site in a manner that is responsive to actual site conditions. A decontamination area will be set up at an appropriate site location. Receptacles will be provided for all disposable clothing. The receptacles will be conventional trash cans lined with heavy duty polyethylene trash bags. Wash tubs containing a detergent-water solution or an appropriate decon solution (see below) and soft-bristle brushes will be used to decontaminate reusable personnel protective clothing and boots. Following the detergent-water washing, an

intermediate rinse will be applied when applicable. Clean, potable water will be used for the final rinsing. Each individual shall conduct proper personal hygiene which may include washing any exposed skin prior to eating, smoking, or leaving the site, consistent with site conditions.

Air monitoring equipment will be brushed to remove any obvious contamination, and will be taken into the trailer for recharging and calibration. The wash waters used and the disposable items will be collected.

6.4.1 Initial Decontamination

- Wash boots, gloves, respirators (see below).

- Put re-useable field gear inside trash barrel for transport to central wash facility. Put respirators in separate baggie, if contaminated, and label.

- Dispose of disposable suits and any other disposable and/or uncleanable equipment in the proper receptacle on site. Check with team leader if uncertain.

6.4.2 Decontamination Procedures

- Respirators

  - Remove filters and cartridges and carefully wipe clean as much as possible. If prefilters (outside filters in snap-on rings) are dirty, replace them with fresh ones. Put filters/cartridges in baggies. If respirator has surface dirt, clean external and internal surfaces with the decon solution provided and water. Wipe internal surfaces with alcohol. Use packaged wipe for daily nominal disinfection.

- At least once a month disinfect/sterilize respirators by leaving them 10-30 minutes in CIDEX or a comparable solution. Thoroughly rinse respirator with distilled water, rub dry, wipe with alcohol wipes, and store in baggie. See additional instructions in field manual. Note that we use high-efficiency filters, which, coupled with prefilters, should increase the lifetime about 6 times as compared to comparable standard cartridges.

  [Note: Personnel with respiratory tract infections, however minor they may seem, should disinfect at least weekly and, if possible, daily.]

- Other Equipment

  - Brush and scrub gloves and boots, then continue with decon solution and water.

  - Rinse thoroughly. Use some disinfectant or alcohol wipes for inside of gloves. Occasionally use chlorox or CIDEX on inside of boots to alleviate odor problems. Be sure to rinse thoroughly after using CIDEX or chlorox. Hang boots and gloves to dry on drying rack. Dry other equipment with paper towels.

- Heavy Equipment

  - All heavy equipment must be decontaminated prior to leaving the site. This will include manual removal of gross contamination with shovels, etc., followed by a steam or high pressure wash, paying particular attention to tracks, wheels, and undercarriages.

6.4.3 Decon Solutions

Decon solutions are prepared to react with, neutralize, or physically remove specific contaminants on a site. All decon solutions and rinse waters are collected for proper disposal.

Decon Solution 1 - for light contamination; liquinox-based

Decon Solution 2 - for organic contaminants; detergent-based

Decon Solution 3 - for most acids and alkalies; trisodium phosphate based

Decon Solution 4 - for organophosphates, cyanides; calcium hypochlorite based

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7. EMERGENCY PROCEDURES

THIS SECTION DISCUSSES EMERGENCY PROCEDURES FOR EACH SITE. EMERGENCY TELEPHONE NUMBERS ARE PROVIDED FOR LOCAL AMBULANCE, POLICE, FIRE AND HOSPITAL SERVICES AND KEY TEAM PARTICIPANTS (I.E., SITE MANAGER, SAFETY OFFICER, ETC.). THE SECTION ALSO DISCUSSES ACCIDENTS AND INJURIES, FIRE, EXPLOSION, SITE EVALUATION, AND SAFETY OF THIRD PARTIES.

7.1 EMERGENCY TELEPHONE NUMBERS

Ambulance:

Police:

Fire Department:

Hospital:

Field Office:

Project Manager:

Health & Safety Officer:

7.2 HOSPITAL

Hospital emergency room personnel will be contacted and briefed regarding the scope of the study. The emergency route to the hospital will be mapped and posted inside and outside the field office and in the field manual. Travel time to the emergency room will be posted on the map.

The list of emergency telephone numbers will also be posted. A local accredited physician will be identified for emergency referrals and the hospital will be notified accordingly.

7.3 ACCIDENTS/INJURIES

Depending on the severity of the injury, treatment may be given at the site by trained personnel, additional assistance may be required at the site (emergency medical technicians), or the victim may have to be transported to hospital.

In life threatening situations, care must begin WITHOUT considering decontamination.

Outside protective clothing can be removed if it does not cause delays or aggravate the problem. Respirators must always be removed. Normal decontamination procedures should be followed when at all possible.

Heat-related illnesses can occur at any time when protective clothing is worn. Heat stroke requires prompt treatment to prevent irreversible damage or death. Unless the victim is obviously contaminated, decontamination should be minimized and treatment begun immediately.

It will be the responsibility of the Health and Safety Officer to investigate thoroughly the details of any accident or injury. Based on his findings, he should recommend any corrective action relative to field procedure to prevent recurrence. ENG Form 3394 will be completed in accordance with AR 385-40 and the USACE Supplement 1 to that regulation.

ORIGINAL (Red)

7.4 FIRE

The potential for fire is significant at many hazardous waste sites. During subsurface operations, explosimeters and organic vapor analyzers are used to monitor levels of potentially combustible gases. Fire extinguishers (Class ABC) will be kept at each drilling rig or backhoe, at the decontamination area, and in the office. Local fire departments will be alerted to the nature and location of any field investigation.

7.5 EXPLOSION

There is frequently the possibility of explosion during hazardous material investigations. Work will be stopped and the situation evaluated when readings in excess of 20% of the lower explosive limit are obtained.

7.6 SITE EVACUATION

7.6.1 Stages of Evacuation

Three stages of evacuation have been determined:

- Withdraw from immediate work area
- Withdraw from site
- Withdraw from area

Withdrawal from Work Area

Withdrawal to a safe upwind location will be required if any of the following occur:

- Concentrations of volatile organics, combustible, or toxic gases are detected above safe levels for the level of protection being worn.

- Occurrence of a minor accident - Field operations will resume after first aid and/or decontamination procedures have been administered.

- Equipment, protective clothing, or respirator malfunctions.

Evacuation of Site

The site will be evacuated in the following cases:

- Explosive levels of combustible gases, toxic gases, or volatile organics are detected (<50 percent LEL)

- A major accident or injury occurs

- Fire and/or explosion occurs

Evacuation of Nearby Area Facilities

The Site Manager is responsible for determining if circumstances exist for area contamination, and should always assume worst-case conditions until proven otherwise. Fire and police departments must be contacted. A list of their addresses and telephone numbers will be located in the field office, and will be carried by the Site Manager.

7.7 SAFETY OF THIRD PARTIES

Site access will be controlled such that only verified team members, waste removal subcontractors, and previously approved

guests will be allowed in work areas or areas containing potentially hazardous materials or conditions. Special badges/passes may be issued as needed. Unauthorized, after hours access will be deterred by locked gates, fences, etc., as is practical and appropriate for the site. The enclosed and non-enclosed areas of the site will be posted with warning and/or No Trespassing signs, subject to community relations considerations.

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8. MEDICAL MONITORING PROGRAM

THIS SECTION PROVIDES A GENERIC DISCUSSION OF THE MEDICAL MONITORING PROGRAM.

Each individual will undergo and pass a comprehensive physical examination prior to going to any hazardous site. Subcontractor personnel are required to furnish documentation of equally comprehensive examinations. Annual or quarterly monitoring may be required if indicated.

The tests included in the examination are described in Table 8-1. Other tests can be added if warranted by special needs or exposure history. An example of the medical history forms are shown in Appendix C.

8.1 INITIAL EXAMINATION

The initial examination is intended to determine each employee's complete medical history as well as the compatibility of the (bio)medical status with the job description. For example, minimum physical requirements must be met:

- Vision - Binocular vision is required, and must be correctable to 20/40 (Snellen) in one eye and 20/20 in the other. Normal depth perception and basic color distinction are required.

- Hearing - Hearing loss in either ear should be no more than 30 dB at 500, 1000 and 2000 hertz

- Smell - Normal

- Speech - No conditions causing indistinct speech

- Other - No disease or condition which would interfere with the full performance of duties.

An electrocardiogram and spirometry are performed. The electrocardiogram is recorded as optional for annual re-examination. It is, however, suggested that employees over 35 years of age and employees with cardiac risk factors (overweight, smoking) be required to have annual EKGs.

Chest x-rays have, for the most part, been eliminated from the physical examination except for the initial baseline exam. The physician gives the patient a complete examination of the chest. This, coupled with the pulmonary function studies, gives the doctor sufficient information relative to any potential pulmonary problems. If chest x-rays are indicated from the results of later examinations, they are then performed. This decision is left to the discretion of the examining physician.

In addition, an extensive battery of hematological and serum chemistry determinations are performed. Hematological tests include a full blood count with differential and platelet count.

The standard serum-enzyme chemistry is also performed for the following parameters:

Alsanine aminostransferase (ALT, SGPT)
Aspartate aminotransferase (AST, SGOT)
Albumin
Alkaline phosphatease
Bilirubin (total)
Blood Urea Nitrogen (BUN)
BUN/Creatinine ratio
Calcium
CO_2 (Content)
Cholesterol

Chloride
Creatinine
Globulin
Glucose
Lactate dehydrogenase (LDH)
Phosphorus (Inorganic)
Potassium
Protein
Sodium
Triglycerides
Uric acid

A routine urine analysis is performed, including observation of color, specific gravity, and microscopic examination of formed elements and pathologically significant elements not normally present such as glucose, protein, blood, ketones, and bile acids. The majority of these parameters are indicative of kidney dysfunction.

Audiometry (hearing examination) is often included in the examination cycle if significant noise exposure is anticipated (i.e., working in close proximity to heavy equipment for extended periods of time).

8.2 QUARTERLY EXAMINATIONS

Quarterly examinations consist of blood chemistry and enzyme tests, focused on the detection of preclinical signs and imminent adverse health effects. These tests require serum and urine analysis only and can be performed by licensed paramedical personnel. Quarterly exams can be performed on all site members, as deemed necessary by the Health and Safety Officer, depending on frequency and duration of field work.

8.3 ANNUAL EXAMINATION

Annual examinations are generally a repeat of the initial examination. A number of the recommended biomedical tests for the establishment of baseline and sensitivity parameters can sometimes be dispensed with at this time. All personnel included in the initial exam program are given annual exams.

8.4 SPECIAL PARAMETERS

If indicated by the medical history and/or initial laboratory results, the examining physician will order additional tests. In addition, a host of parameters can be added to the parameters mentioned to account for prior and expected exposure conditions. An example would be exposure of heavy metals. If lead is a primary agent, a blood lead evaluation would be performed, including a quantitative blood lead determination. Other heavy metals could be analyzed in either blood or urine samples.

Summary reports of the examinations are provided and reviewed with each employee. Medical/exposure monitoring records will be maintained for a specified period of time in accordance with the provisions of OSHA (29 CFR 1910).

*****

TABLE 8-1 STANDARD BIOMEDICAL MONITORING

Test	Initial Examination	Quarterly Checkup	Annual Examination
Full physical	X		X
EKG	X		(X)
Chest X-ray	X		(X)
Hematology evaluation (including complete blood count, differential and platelet count)	X	X	X
Hemoglobin and hematocrit	X	(X)	X
Urinalysis	X	X	X
Vision screen	X		X
Executive profile (SMA-22, CBC, thyroid profile)	X		X
Pulmonary function	X		X
Audiometry	X		(X)
Proctoscopic exam	(X)		(X)

(X) - Included at the discretion of the accredited physician.

APPENDIX A

SITE SPECIFIC HEALTH AND SAFETY PLAN

LAW ENVIRONMENTAL SERVICES
Government Services Division
1140 Hammond Drive, Suite 5150-E
P. O. Box 888013
Atlanta, Georgia 30356
TEL: (404) 396-8000

HEALTH AND SAFETY PLAN

REVIEW AND APPROVAL

Health and Safety Officer Bill Harris

Senior Engineer/Scientist Harold Whitney

Field Safety Coordinator Steven Shugart

Chief Engineer Harold Whitney

DATE OF PLAN PREPARATION DATES OF PLANNED FIELD ACTIVITIES

MEDICAL SURVEILLANCE

All LES field personnel participate in the LES medical monitoring program.

DESCRIPTION OF CLIENT SAFETY PROGRAM

All work accomplished in accordance with the provisions of OSHA (29 CFR 1910 & 1926) and EM 385-1-1 COE. The most restrictive requirements apply.

EMERGENCY PHONE NUMBERS

(To be obtained by Field Safety Coordinator prior to beginning work.)

HOSPITAL: To be filled in
FIRE: on site specific basis
POLICE:

ORIGINAL (Red)

EMERGENCY PROCEDURES

In event of overt personnel exposure (skin contact, inhalation, ingestion):

Skin - remove contaminated clothing, wash with soap and water

Inhalation - remove to fresh air

Eye Contact - flush with eye wash and copious amounts of water - get medical help

Ingestion - get medical help if indicated

In event of personnel injury:

Administer first aid if needed. Medical emergencies take precedence over decontamination procedures. Know route to nearest medical facility.

In event of potential or actual fire or explosion:

Do not fight fire. Contact Fire Department and/or client company officials as appropriate. Evacuate if necessary to upwind "clean" location.

In event of environmental accident (spread of contamination outside HWS):

Contact Harold Whitney or Bill Harris

SITE INFORMATION

HAZARDOUS/TOXIC MATERIAL (known or suspected)
Chlorinated solvents, hydrocarbons, IRFNA - nitrogen dioxide dissolved in nitric acid

HAZARD ASSESSMENT
Based on initial inspection, likelihood of exposure to contaminants appear minimal, other than direct contact with possibly contaminated soil or water samples.

LOCATION OF SITE "CLEAN AREA" AND DECONTAMINATION STATION

Clean area is outside a radius of 25 feet surrounding any operating unit, i.e. a drill rig, sampling crew etc.

WORK PROCEDURES

PLANNED FIELD ACTIVITIES

Install 4 Monitoring wells - Take Soil and Water Samples

SITE MONITORING PROCEDURES

Monitor boreholes with organic vapor detector and explosimeter to detect toxic materials as well as volatile or combustible gases.

PERSONNEL MONITORING PROCEDURES

Visual observations during drilling by Site Manager
Quarterly and annual medical exams administered by Atlanta Occupational Medicine.

CLOTHING AND PROTECTIVE GEAR REQUIRED

Required to be worn while drilling:

Steel toed, chemically resistant (Neoprene) Safety shoe
Distinct set of field clothes
Hardhat, gloves

To be readily available on Site:

Polylaminated Tyvek coveralls, Fire extinguisher
Safety glasses or goggles, First aid kit,
Air-purifying respirator

DECONTAMINATION PROCEDURES

Personnel - soap and water (as appropriate)
Equipment - Detergent or calcium hypochlorite based cleaning solution or live steam

DISPOSAL PROCEDURES

Disposable items handled as refuse at discretion of Site Manager

WORK PRECAUTIONS

1. Prior to any employee or subcontractor personnel beginning work on the HWS, the Field Safety Coordinator shall brief the employee on the contents of this plan.

2. No eating, drinking, smoking or putting hands in mouth while on the site.

3. ~~Wear tyvek suits, rubber gloves and rubber boots at all times while on the site.~~ Begin site work at Level E and upgrade to Level D if necessary.

4. Wash all exposed skin areas with soap and water before departing from the site, as appropriate. Take shower after arriving at temporary field place of residence

5. Remove and change any non-impervious clothing that becomes contaminated during site activities.

6. Do not go anywhere on the site other than where directed by the Field Safety Coordinator.

7. Use safe and legal procedures for sample storage and shipment.

PERSONNEL POTENTIALLY EXPOSED TO HAZARDOUS MATERIALS

Personnel Authorized to Enter HWS

1. LES - Gov't Services Personnel
2. Drilling Contractor
3. Survey Crew
4. Representatives of site owner
5. Representatives of COE

Other Personnel Assigned to Handle Hazardous Materials (decontaminate, analyze samples)

1. IT Analytical Services
2.
3.
4.
5.

FIELD SAFETY COORDINATOR'S SUMMARY

(To be completed by Field Safety Coordinator after completion of field work, and returned to Health and Safety Officer.)

During the work and covered by the Safety Plan, there were:

a. No violations of the Safety Plan provisions and no obvious contamination of LES employees or subcontractors.

b. The following violations of the Safety Plan provisions or obvious contamination of LES personnel or subcontractors. (Give details of who, when, type of contamination, circumstances, first aid or medical assistance.)

_____

_____

_____

_____

_____

Signature_____Date_____
Field Safety Coordinator or
Site Manager

ALL ACCIDENTS AND INCIDENTS CAUSING POTENTIAL EXPOSURE TO HAZARDOUS MATERIALS MUST BE REPORTED AS SOON AS POSSIBLE TO:

1) HEALTH AND SAFETY OFFICER, or
2) CHIEF ENGINEER, or
3) BRANCH MANAGER

APPENDIX B

PERSONAL PROTECTIVE EQUIPMENT

A.1 PERSONAL PROTECTION AND SAFETY EQUIPMENT

The health and safety plan recognizes five levels of protection. This represents a slight variance from EPA operating guidelines and allows an additional level of protection between EPA levels C and D. The following proposed levels of protection are based on organic vapor analyzer readings, as recommended by EPA.

A.1.1 Protective Equipment and Selection Criteria

Level A

Level A is worn when the highest level of respiratory, skin, and eye protection is required.

Protective Equipment Required

- Pressure-demand (positive pressure) SCBA, NIOSH/MSHA approved
- Fully encapsulated suit
- Gloves (inner) viton
- Gloves (outer) chemical-resistant, Neoprene
- Boots, chemical-resistant, steel toe and shank
- Hard hats
- Two-way radio communication
- Disposable coverall chemical suit

Selection Criteria

Any of the following conditions warrants Level A protection:

- Chemical substance has been identified which requires highest form of protection based on measured (or potential) high concentrations of atmospheric vapors, gases, or particulates; or work functions involve high potential for exposure to vapors, gases, or particulates.
- Extremely hazardous substances (e.g., dioxin, Department of Transportation [DOT] Class "A" poisons, concentrated pesticides) are known or suspected, and skin contact is possible.
- The potential exists for contact with substances that destroy skin.
- Reading on the organic vapor analyzer meter exceeds 500 ppm.
- Operations are conducted in confined, poorly ventilated areas or unknown air quality hazards.

Level B

Level B safety gear is worn when the highest level of respiratory protection is required, but a lesser degree of skin protection is required.

Protective Equipment

- Pressure-demand (positive pressure) SCBA, NIOSH/MSHA approved

- Chemical-resistant splash suit or polycoated disposable chemical-resistant coveralls
- Gloves (inner), vitron
- Gloves (outer), chemical resistant (taped to sleeves)
- Boots, inner, chemical-resistant, steel toe and shank
- Boots, outer, disposable (taped to cuffs)
- Emergency escape air supply
- Hard hats
- Two-way radio communication

Selection Criteria

- Atmospheres with chemical concentrations considered Immediately Dangerous to Life and Health (IDLH).
- Atmospheres exceeding limits of protection afforded by a full-face, air-purifying respirator.
- Atmospheres containing substances with poor warning properties, substances for which air-purifying cartridges do not exist, or have low removal efficiency.
- Atmosphere containing <19.5 percent oxygen.
- Conditions are such that small exposed areas about the head and neck will not be contacted by hazardous substances.
- Atmosphere contains from 50 to 500 ppm volatile organics as measured by the organic vapor analyzer.

Level C

Level C safety equipment will be worn when the types and concentrations of airborne contaminants are known, and the criteria for using air-purifying respirators are met.

Protective Equipment

- Full-face, air-purifying respirator with suitable cartridges, fit tested
- Chemical-resistant suit or polycoated disposable chemical-resistant coveralls
- Gloves (inner), viton
- Gloves (outer, chemical-resistant (taped to sleeves)
- Boots (inner), steel toe and shank
- Boots (outer), disposable (taped to cuffs)
- Emergency escape air supply
- Hardhat

Selection Criteria

- Atmospheric contaminant concentrations do not exceed IDLH levels.
- Air concentrations of identified substances will be reduced by the respirator to below the substance(s) exposure limit.
- Service limit of respirator cartridges will not be exceeded.
- Conditions are such that small exposed areas about the head and neck will not be contacted by hazardous substances.

- Job functions do not require SCBAs.
- Atmospheres contain between 19.5 and 25 percent oxygen.
- Atmosphere contains between 10 and 50 ppm volatile organics as measured by the organic vapor analyzer.
- Individual has been sucessfully fit tested.

Level D

Level D safety equipment has been modified from EPA protocols so that an additional safety level can be added between the requirements of Level C and the basic work uniform (EPA Level D). The basic work uniform is presented as part of Level E.

Protective Equipment

- Half-face, air-purifying respirator
- Chemical-resistant suit or disposable chemical-resistant coveralls
- Gloves, neoprene
- Cotton gloves as liners if needed
- Boots (inner), steel toe and shank
- Boots (outer), disposable
- Emergency escape air supply
- Hardhats
- Safety goggles
- Face shield (integral to hardhat)

Selection Criteria

- Atmospheric contaminant concentrations do not exceed IDLH levels.
- Air concentrations of identified substances will be reduced by the respirator to below the substance(s) exposure limit.
- Service limit of respiratory cartridges will not be exceeded.
- Conditions are such that small exposed areas about the head and neck will not be contacted by hazardous substances.
- Job functions do not require SCBAs.
- Atmospheres contain between 19.5 and 25 percent oxygen.
- Atmosphere contains detectable levels of volatile organics, but <10 ppm as measured by the organic vapor analyzer.

Level E

Level E equipment will be worn only in areas where contact with contaminated materials is extremely unlikely. It is primarily intended for surface reconnaissance work.

Protective Equipment

- Half-face, air-purifying respirator (carried)
- Coveralls, cotton
- Boots, steel toe and shank

- Boots (outer), disposable (optional)
- Hard hats
- Neoprene gloves with cotton liners (optional)

Selection Criteria

Level E protection is the basic work uniform. It can be worn in areas where only boots can be contaminated, and no inhalable toxic substances are present.

APPENDIX C

MEDICAL FORMS

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Check Past Illnesses:

	(Age)		(Age)		(Age)
☐ Chickenpox	____	☐ Pneumonia	____	☐ Mononucleosis	____
☐ Measles	____	☐ Bronchitis	____	☐ Venereal Disease	____
☐ German Measles	____	☐ Pleurisy	____	☐ Meningitis	____
☐ Mumps	____	☐ Tuberculosis	____	☐ Heart Attack	____
☐ Scarlet Fever	____	☐ Malaria	____	☐ Kidney Trouble	____
☐ Rheumatic Fever	____	☐ Ulcer	____	☐ Stroke	____
☐ Hay Fever	____	☐ Hepatitis	____	☐ Phlebitis	____
☐ Asthma	____	☐ Cancer	____	☐ High Blood Pressure	____
Other:					

Operations: (Age) _____

Serious Injuries (broken bones, knocked unconscious, etc.): (Age) _____

Pregnancies (and any serious complications): (Age) _____

Contraception (type): _____ Have you had a skin test for tuberculosis? _____ Result: _____

Immunizations or Vaccinations within the past ten years (and approximate date): _____

Recent drugs or patent medicines (include laxatives, antacids, aspirin, etc): _____

Allergies (medications, pollens, foods, etc.): _____

Sleep (how much; sound or fitful?): _____

Diet (is it well balanced? _____ Special?): _____

Tobacco (packs per day): _____ Alcohol (drinks per day or week): _____ Coffee (cups per day): _____ Regular or no caffeine: _____

Have you ever smoked? _____ How Long? _____ Have you ever tried to stop smoking? _____

What Symptoms did you have? _____

Birthplace. States where you have resided, and Foreign Travel: _____

Education (highest level completed; special studies): _____

Type of exercise and hobbies: _____

Special problems related to home or work conditions: _____

Check if anyone in your family has ever had the following

	Relationship		Relationship		Relationship
☐ Diabetes	____	☐ High Blood Pressure	____	☐ Anemia	____
☐ Heart Disease	____	☐ Cancer	____	☐ Bleeding Disorder	____
☐ Stroke	____	☐ Migraine Headaches	____	☐ Obesity	____
☐ Thyroid Disorder	____	☐ Ulcers	____	☐ Kidney Disease	____
☐ Gout	____	☐ Hay Fever or Asthma	____	☐ Epilepsy	____
☐ Mental Illness	____	☐ Allergies	____	☐ Other	____

	If Living		If Deceased			If Living		If Deceased	
	Age	State of Health	Age	Cause		Age	State of Health	Age	Cause
Mother	____	____	____	____	Father	____	____	____	____
Brothers	____	____	____	____	Sisters	____	____	____	____
Husband Wife	____	____	____	____	Children	____	____	____	____

(If you need more space use back side)

NAME.
DATE.

Check the preceding box if you now have (or have recently had) any of the following:

- ☐ Fever
- ☐ Poor appetite
- ☐ Skin itching
- ☐ Easy bruising
- ☐ Severe blow to the head
- ☐ Double vision
- ☐ Need for glasses
- ☐ Ear drainage
- ☐ Nosebleeds
- ☐ Frequent sneezing
- ☐ Frequent sore throats
- ☐ Chronic cough
- ☐ Trouble breathing
- ☐ Irregular or excessively rapid heartbeat
- ☐ Blue lips, fingers, toes
- ☐ Heartburn
- ☐ Regurgitation of food or vomiting
- ☐ Painful bowel movements
- ☐ Mucus with bowel movements
- ☐ Intestinal worms
- ☐ Urgent urination
- ☐ Awakening from sleep to urinate - How many times each night? _____
- ☐ Age at first period ( )
- ☐ Discomfort during periods
- ☐ Hot flashes
- ☐ Joint stiffness
- ☐ Bursitis
- ☐ Excessive appetite, thirst, or urination
- ☐ Impotence
- ☐ Paralysis
- ☐ Nervousness
- ☐ Crying spells
- ☐ Excessive anger or temper
- ☐ Feeling that people are "out to get you"

- ☐ Sweats
- ☐ Weight gain
- ☐ Facial flushing
- ☐ Excessive bleeding
- ☐ Fainting spells
- ☐ Blind spots
- ☐ Earache
- ☐ Ear blockage
- ☐ Nasal obstruction
- ☐ Sores in the mouth
- ☐ Frequent runny nose
- ☐ Coughing up phlegm
- ☐ Shortness of breath with exertion
- ☐ Varicose veins
- ☐ Cold hands or feet
- ☐ Indigestion
- ☐ Vomiting blood
- ☐ Greasy bowel movements
- ☐ Constipation
- ☐ Burning with urination
- ☐ Bloody urine
- ☐ Difficulty starting urination
- ☐ Duration of periods ( )
- ☐ Unusually light flow
- ☐ Bleeding after menopause
- ☐ Tender bones or joints
- ☐ Bodily deformity
- ☐ Change in size of head, hands, or feet
- ☐ Loss of sexual drive
- ☐ Tremors, seizures, twitching, convulsions
- ☐ Anxiety
- ☐ Feelings of helplessness
- ☐ Trouble accepting criticism
- ☐ Seeing or hearing things that don't exist (hallucinations, voices)

- ☐ Chills
- ☐ Weight loss
- ☐ Boils
- ☐ Anemia
- ☐ Lightheadedness
- ☐ Eye pain
- ☐ Trouble hearing
- ☐ Ear itching
- ☐ Sinus trouble
- ☐ Hoarseness
- ☐ Breast lumps, swelling, or pain
- ☐ Coughing up blood
- ☐ Trouble breathing when lying flat
- ☐ Ankle swelling
- ☐ Heart murmur
- ☐ Frequent belching or passing gas
- ☐ Abdominal or stomach pain or discomfort
- ☐ Frequent loose bowel movements
- ☐ Hernia
- ☐ Frequent urination
- ☐ Kidney stones
- ☐ Prostate trouble
- ☐ Time between periods ( )
- ☐ Unusually heavy flow
- ☐ Vaginal discharge or irritation
- ☐ Tender muscles
- ☐ Goiter or enlarged thyroid gland
- ☐ Darkening of the skin
- ☐ Numbness or tingling of mouth, arms, or legs
- ☐ Incoordination
- ☐ Irritability
- ☐ Thoughts of suicide
- ☐ Strong fears

- ☐ Fatigue
- ☐ Skin rash
- ☐ Swollen glands (or lymph nodes)
- ☐ Headache
- ☐ Blurred vision
- ☐ Eye inflammation
- ☐ Ringing in the ears
- ☐ Dizziness
- ☐ Post nasal drip
- ☐ Serious dental problems
- ☐ Discharge from the nipple
- ☐ Wheezing
- ☐ Chest pain
- ☐ Leg cramps
- ☐ Trouble swallowing
- ☐ Nausea
- ☐ Black bowel movements
- ☐ Blood with bowel movements
- ☐ Yellow jaundice or liver trouble
- ☐ Excessive urine volume
- ☐ Inability to control the urine
- ☐ Pain, ulceration, swelling of, or discharge the genitals
- ☐ Discomfort before periods
- ☐ Menopause (change of life) Age
- ☐ Joint pain
- ☐ Back trouble
- ☐ Sugar in the urine (diabetes)
- ☐ Sterility
- ☐ Weakness
- ☐ Slurred speech
- ☐ Depression
- ☐ Desire to harm someone
- ☐ Constant worrying

NAME:

DATE:

ORIGINAL (Red)

6

ARMY REGULATION
No. 5-9

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC 20310, *17 May 1974*

MANAGEMENT

INTRASERVICE SUPPORT

INSTALLATION AREA COORDINATION

Effective 1 July 1974

This regulation provides basic departmental guidance regarding coordination of Continental United States (CONUS) intraservice support to units and individuals located off-post. It is to be implemented in conjunction with AR 37-49, Financial Administration: Budgeting, Funding, and Reimbursement for Base Operations Support of Army Activities, and AR 5-8, Host-Supported Activity Relationships (Intraservice). Supplementation of this regulation is authorized.

	Paragraph	Page
Purpose	1	1
Scope	2	1
Explanation of terms	3	1
Objective	4	1
Concept of installation area support	5	1
Responsibilities	6	2
Policies	7	3
Appendix A. Area Support Functions		A-1
B. Area Support Function Maps		B-0

1. Purpose. This regulation establishes Department of the Army policies and responsibilities for coordination of intraservice area support by CONUS installations to units and individuals located off-post.

2. Scope. This regulation applies to active Army units and activities, reserve components and installations of the Army in CONUS, the Commonwealth of Puerto Rico and the Virgin Islands.

a. Installation Area Support coordination responsibilities are assigned by function to Army Staff agencies, CONUS major Army commands (MACOMs), and installations.

b. This regulation supplements existing DOD support programs outlined in AR 1-35, Basic Policies and Principles for Interservice, Interdepartmental and Interagency Support, and AR 415-6, Commercial and Industrial-Type Activities.

3. Explanation of Terms. *a. Installation Area Support (Intraservice).* Support provided by CONUS installations and activities to active Army units, reserve component units and individuals located off-post within CONUS geographic areas delineated by HQDA as depicted at appendix B.

b. Installation Support Area. A CONUS geographic area delineated by HQDA for specific type(s) of intraservice functional support and where overall coordination responsibility for provision of the support rests with a single installation commander.

c. Area Support Coordinating Installation. An installation responsible for management and coordination of intraservice functional support within an area delineated by HQDA for the specific type of support.

4. Objective. To implement the concept of area support by providing a framework for advising off-post active Army and reserve component units and individuals concerning and, where necessary, coordinating intraservice support provided by installation commanders to off-post units and individuals within a designated area. For each type of support provided, area support coordinating installation commanders will coordinate off-post support responsibilities of all other installations and activities within the specified support area.

5. Concept of Installation Area Support. The following concept is provided as a means by which coordination of intraservice area support can be provided and is not intended to limit or

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channel a commander toward specific solutions or procedures.

a. The Installation Area Support program is designed to provide CONUS Army support to units and individuals located off-post. The area support coordinating installation provides off-post units and individuals a coordination point from which available support can be identified, coordinated, or provided. The designated installations (appendix B) will maintain a directory of intraservice support available in its area of responsibility in order to best advise an off-post unit or individual where to seek necessary assistance. Normally, the organization which can best provide the required support will be identified. If an Area Support Coordinating Installation does not have the capability of providing the required support, or if required support can be more economically provided by another installation, it is responsible for coordinating this support from available sources.

b. This program complements the previously established interservice, interdepartmental and interagency support programs (AR 1-35 and DOD 4000.19-M) and the commercial and industrial-type functions program (AR 235-5). Together, these programs establish policies and procedures for the provision of all support from all available sources and, as such, must be closely interfaced. It is logical that installations and intermediate headquarters will consolidate responsibility for these programs wherever possible.

c. The commander of an area support coordinating installation will advise units and installations on area support problems and attempt to resolve the problem before it escalates to the MACOM level. The commander will also act as the point of contact and the negotiator within the area for the more isolated individuals and units for the purpose of advising and assisting in obtaining the required support.

d. All installations, including area support coordinating installations, will continue to be responsible for support within mission capability. In cases where an installation is unable to provide support which has been requested, the installation should contact the area support coordinating installation for whatever advice and assistance can be provided. The commander of the area support coordinating installation should consider providing the support from his own resources when other support options are not available or inform the MACOM of the inability to provide the requested support from within the installation support area.

e. Area support coordinating installations should periodically review coordination requirements in order to provide service from one office on all functions indicated in appendix A.

6. Responsibilities. *a.* Army Staff proponents for intraservice functional support are listed at appendix A. Installation coordination responsibilities by geographic area for each of the listed functions are at appendix B.

b. The Comptroller of the Army (COA) is responsible for policies pertaining to the management of installation area coordination of intraservice support.

c. Heads of Army Staff agencies will:

(1) Provide to COA the assignment of installation area support missions.

(2) Provide guidance and implementing instructions to the CONUS MACOM's and installations within the functional areas indicated in appendix A.

d. Management and coordination for geographic area support responsibilities within CONUS are assigned to CDR's, TRADOC; FORSCOM; AMC; USACC; USAHSC; USASA; and USAMDW. The basic responsibility for insuring proper support lies with the MACOM to which the area support coordinating installation is assigned. It is essential that under this decentralized concept implementing instructions be closely coordinated with impacted MACOM's and proponent agencies to insure that all commands function efficiently and effectively.

e. Commander, Area Support Coordinating Installation will:

(1) Maintain a capability to properly advise off-post units and individuals where support can be provided and coordinate the requested support, if necessary.

(2) Evaluate and resolve support conflicts considering all support options available within the installation support area prior to MACOM involvement. It is necessary for all units and installations to contact the area support coordinating installation prior to contacting the MACOM.

(3) Provide evaluations and recommendations for revisions in support policies, procedures, and operations through the MACOM's involved to HQDA.

f. The installation commander will consider

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and evaluate all performance alternatives to determine the performance option which is least costly to the Federal Government. Performance alternatives considered will include: in-house, intraservice, interservice, interdepartmental, interagency and contract (i.e., contractor-owned contractor-operated facilities or government-owned contractor-operated facilities). Evaluations will be conducted in accordance with policies and procedures prescribed in AR 235-5 and AR 1-35. Decisions to select any specific option will normally be based on the course of action most economical to the Federal Government.

g. Commander, USACC-CONUS has been delegated authority by the Commander, USACC to:

(1) Function as the CONUS Army leasing agency for all leased telecommunications requirements, and changes or deletions to existing leased services or facilities procured under provision of AR 105-23. This authority may be redelegated to authorized representatives of the Commander, USACC-CONUS.

(2) Provide central direction and assistance pertaining to the procurement, use, control and resources management of the Army's CONUS leased telecommunications service and facilities.

7. Policies. *a.* All installations will continue to have a role in providing support to their immediate geographical area.

b. The authority of the commander of the area support coordinating installation over other installations is advisory in nature.

c. As an exception to this regulation, medical coordination and support will be provided as established by the Commander, United States Army Health Services Command in separate directives.

d. Civilian personnel administration services will be in accord with servicing agreements established under DA Civilian Personnel Regulation 200, and in accord with separate directives issued by Commanders and Activity Chiefs possessing delegated authority for civilian personnel management.

e. Recommended revision of area support coordination boundaries will be forwarded to HQDA, ATTN: DACS-DMA through command channels. Installations will coordinate with adjacent installations before submitting requests for boundary revisions.

f. Funding: Intraservice base operations support will be furnished in accordance with AR 37-49 when such support is not included in the basic mission of the host installation (see appendix B). Intraservice support other than base operations will be furnished on a reimbursable basis in accordance with AR 37-27, Accounting Policy and Procedures for Intragovernment, Intradefense, and Intra-Army Transactions, unless authorized by an approved host-tenant agreement or other valid authority.

g. Intraservice Area Support responsibility will be consolidated with interservice support offices and functions where possible.

APPENDIX A

AREA SUPPORT FUNCTIONS

Map No.	*Function*	** DA Staff Proponent*	*Reference*
(1)	Logistical Support	DCSLOG	AR 11-22 140-15 710-2 750-1 750-7
	Facilities Engineering	COE	AR 420 Series
(2)	Aircraft Maintenance & Repair Parts—Direct Support	DCSLOG	AR 140-15 710-2 750-1 750-7
(3)	Aircraft Maintenance—General Support	DCSLOG	AR 140-15 710-2 750-1 750-7
(4)	Nuclear Weapons Maintenance	DCSLOG	AR 140-14 710-2 750-1 750-7
(5)	Air Delivery Support (Equipment and Services)	DCSLOG	AR 140-15 710-2 750-1 750-7
(6)	Pay, Disbursing and Accounting on Area Support Basis	COA	AR 11-2 37-6 37-103 37-104-3 37-105 37-108
(7)	Pay, Disbursing and Accounting for ROTC Instructor Groups and all other support less locally funded area support	COA	AR 37-1 37-6 37-103 37-104-3 37-108
(8)	Pay, Disbursing and Accounting for Reserve Component Advisors and USAR Units	COA	AR 37-104-2 37-104-3 37-108 37-125 DA Cir 37-66 DA Cir 37-67 DOD PAY MANUAL

* The DA Staff proponent is responsible for the listed function and not necessarily the proponent for the references.

Map No.	Function	* DA Staff Proponent	Reference
(9)	Civilian and Active Army Pay and Disbursing, Recruiting Districts and Main Stations	COA	AR 37-6 37-103 37-104-3 37-105 37-108
(10)	US Army Reserve and National Guard Drill Pay	DCSOPS	AR 11-22 130-5 37-104-2 NGR 37-104-2
(11)	Pay, Disbursing and Accounting for National Guard	NGB	AR 11-22 130-5 NGR 37-100 NGR 37-104-2 NGR 37-108 NG Pam 37-104-2
(12)	General: Safety Services	TIG	AR 385-10 385-40 385-41
	DA Publications and Forms (USAR & ROTC)	DCSPER	AR 310-2 DA Pam 310-2
	General Education Development (GED)	DCSPER	AR 621-1 621-5
	Army Recreation Services/Army Community Services	TAG	AR 28-1
	Equal Opportunity/Race Relations & Alcohol & Drug Abuse for USAR/ARNG upon request	DCSPER	AR 600-18 600-21 600-42 600-85
	Mobilization Support	DCSOPS	AR 135-300
(13)	Casualty Administration, Retirement Services/Funeral Escorts/Burial Honors	DCSPER	AR 600-10 600-23
(14)	Explosive Ordnance Disposal (EOD)	DCSOPS	AR 1-4 75-14 75-15
(15)	Nuclear Accident Incident Control (NAIC) Chemical Accident Incident Control (CAIC)	DCSOPS	AR 50-5 50-21 360-43
(16)	Training Aids Services Office (TASO)	DCSOPS	AR 71-7
	Training Aids	DCSOPS	AR 108-5
	Photographic Facilities	DCSOPS	AR 108-5
	Audiovisual Support Centers	DCSOPS	AR 108-40
(17)	Educational Television	ACSI	AR 115-1
(18)	Army Weather Warning		

* The DA Staff proponent is responsible for the listed function and not necessarily the proponent for the references.

Map No.	Function	* DA Staff Proponent	Reference
(19)	Base Operating Information System (BASOPS) Standard Installation/Division Personnel Reporting System (SIDPERS)	DMIS	AR 18 Series
		COA	AR 37 Series
		DCSLOG	AR 710–2
		DCSPER	AR 680 Series
	Force Status and Identity Reporting System (FORSTAT)	DCSOPS	JCS Pub 6
(20)	Information Activities	CINFO	AR 360–5 360–6 360–12 360–42 360–43 360–61 360–65 360–81 DA Cir 360–33
(21)	Confinement	DCSPER	AR 190–1 190–2 190–4
(22)	Absentee Apprehension, Physical Security and Other Provost Marshal Activities	DCSPER	AR 190–9 190–11 190–13 190–40
(23)	US Army National Crime Information Center Terminal Operation	DCSPER	AR 190–9 190–11 190–27 FBI NCIC Operating Manual
(24)	Claims	TJAG	AR 17–20
(25)	Unaccompanied Dependent Travel	DCSPER	AR 55–46 (APP V)

* The DA Staff proponent is responsible for the listed function and not necessarily the proponent for the references.

The proponent agency of this regulation is the Office, Director of Army Management. Users are invited to send comments and suggested improvements on DA Form 2028 (Recommended Changes to Publications and Blank Forms) direct to HQDA (DACS-DMA) Washington, DC 20310.

By Order of the Secretary of the Army:

CREIGHTON W. ABRAMS
General, United States Army
Chief of Staff

Official:
VERNE L. BOWERS
Major General, United States Army
The Adjutant General

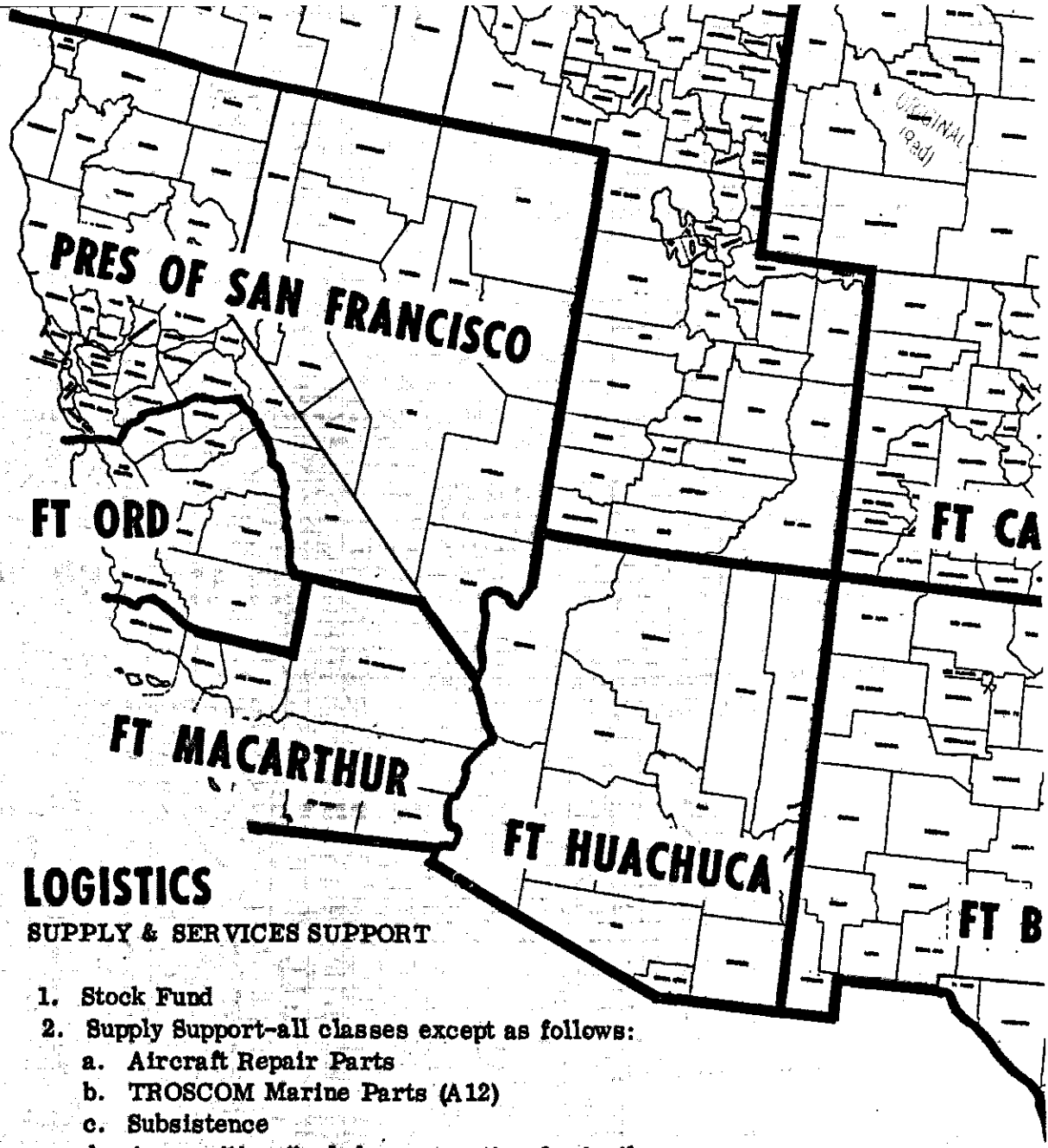
DISTRIBUTION:
Active Army, ARNG, USAR: To be distributed in accordance with DA Form 12-9A requirements for AR, Management—C (CONUS, USARSO) (Qty rqr block no. 7).

* U.S. GOVERNMENT PRINTING OFFICE: 1974—540-861/3756A

APPENDIX B
AREA SUPPORT FUNCTION MAPS

(Locate fold-in pages 1 through 25 at end of regular size pages and insert following this page.)

ORIGINAL (Red)



LOGISTICS

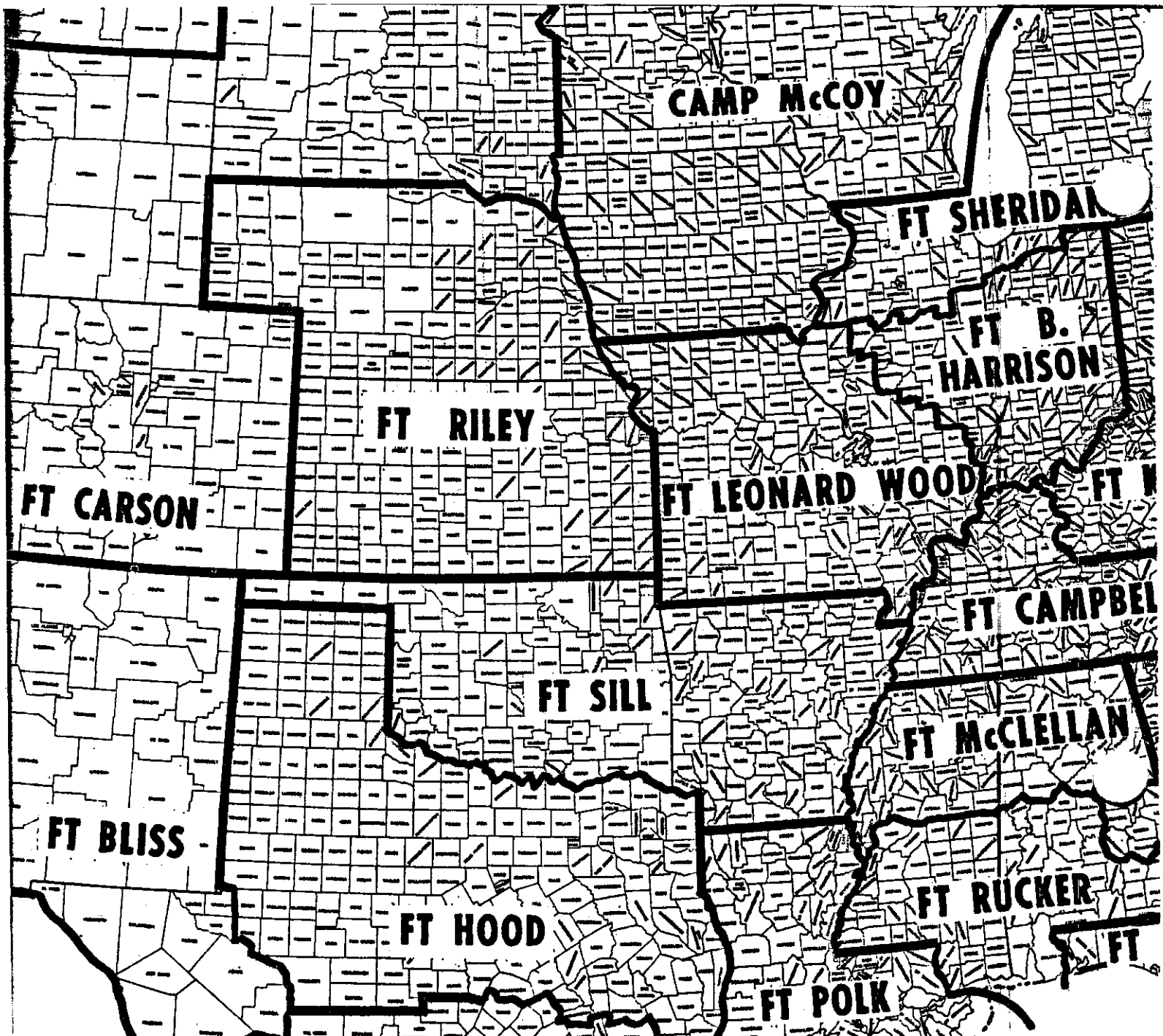
SUPPLY & SERVICES SUPPORT

1. Stock Fund
2. Supply Support-all classes except as follows:
   a. Aircraft Repair Parts
   b. TROSCOM Marine Parts (A12)
   c. Subsistence
   d. Ammunition (includes conventional missiles and rockets)
   e. COMSEC Equipment - Nonaccountable
   f. Nuclear Weapons
   g. Class 8 Medical
3. Commissary Store and Issue
4. Laundry & Dry Cleaning
5. Ammo Surveillance
6. Transportation
   a. Adm Motor Veh Support
   b. Movements
   c. Highway Clearance (USAR & Active Army)
7. Procurement, except leased communications (See AR 105-23).
8. On/Off Post Housing
9. +Property Disposal
10. Mortuary Services
11. Contract Custodial Se
12. Driver Testing
13. Food Services (Active
14. Radiological Control

+ DOD 4160.21-M (DS

MAINTENANCE

1. Automotive
2. Combat Vehicles
3. Construction Equipme
4. Electronic & Communi Equipment
5. Missile System Equip



Disposal
Services
Custodial Services
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0.21-M (DSA to Publish DPDS)

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& Communication

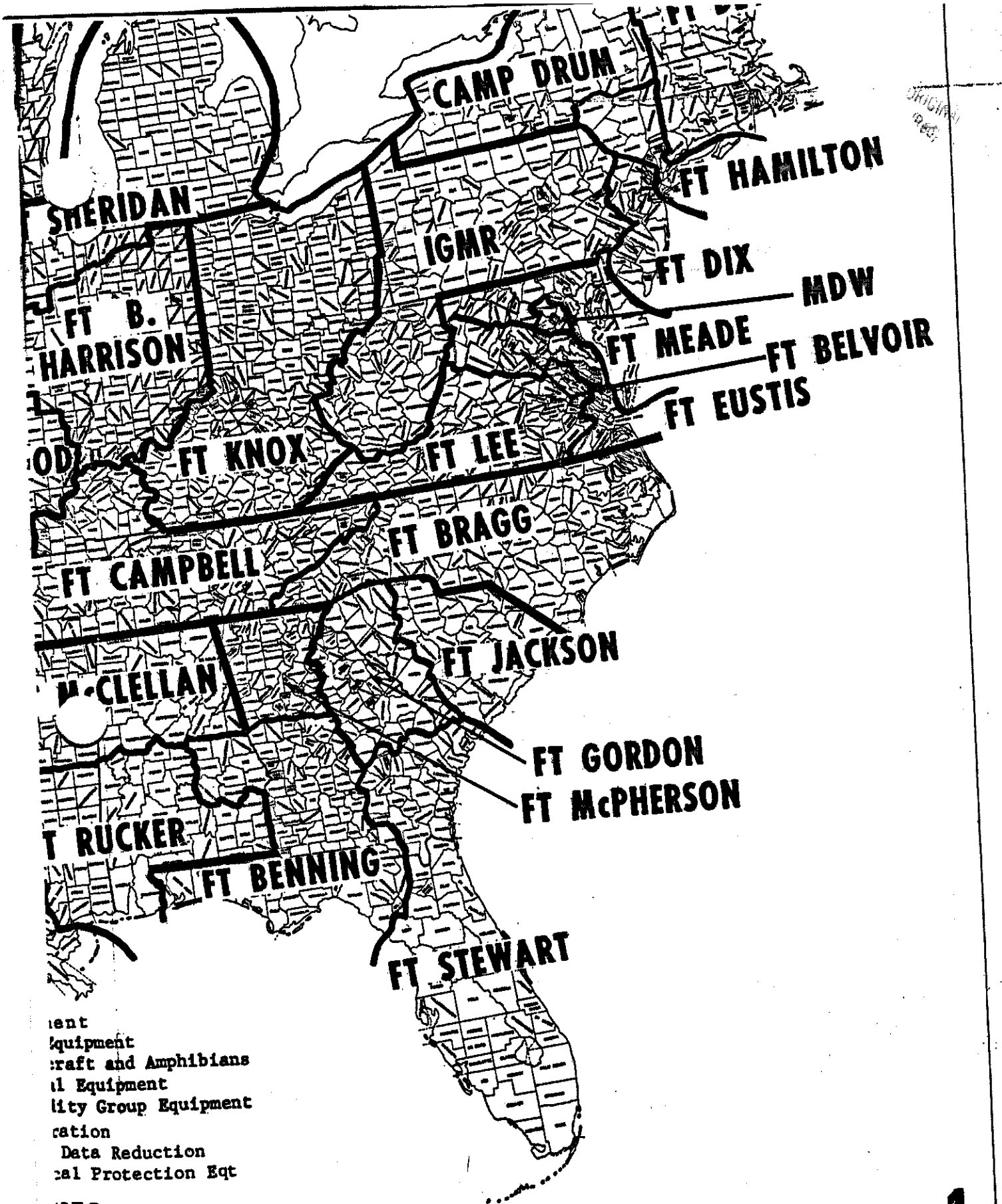
stem Equipment

6. Armament
7. Rail Equipment
8. Watercraft and Amphibians
9. General Equipment
10. Commodity Group Equipment
11. Calibration
12. TAMMS Data Reduction
13. Chemical Protection Eqt

FACILITIES

FACILITIES ENGIN

ORIGINAL
(Red)



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IES

I ENGINEERING

0 100 200 300 400 500 MILES

ALBERS EQUAL AREA PROJECTION

Revised 15 February 1974

1

MSDS *Material Safety Data Sheet*

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

ORIGINAL REC'D

ACETONE

MSDS Number: A0446 --- *Effective Date: 04/10/01*

1. Product Identification

Synonyms: Dimethylketone; 2-propanone; dimethylketal
CAS No.: 67-64-1
Molecular Weight: 58.08
Chemical Formula: (CH3)2CO
Product Codes:
J.T. Baker: 5356, 5580, 5805, 9001, 9002, 9003, 9004, 9005, 9006, 9007, 9008, 9009, 9010, 9015, 9036, 9125, 9254, 9271, A134, V655
Mallinckrodt: 0018, 2432, 2435, 2437, 2438, 2440, 2443, 2445, 2850, H451, H580, H981

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Acetone	67-64-1	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE. HARMFUL IF SWALLOWED OR INHALED. CAUSES

IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 1 - Slight
Flammability Rating: 4 - Extreme (Flammable)
Reactivity Rating: 2 - Moderate
Contact Rating: 1 - Slight
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Inhalation of vapors irritates the respiratory tract. May cause coughing, dizziness, dullness, and headache. Higher concentrations can produce central nervous system depression, narcosis, and unconsciousness.
Ingestion:
Swallowing small amounts is not likely to produce harmful effects. Ingestion of larger amounts may produce abdominal pain, nausea and vomiting. Aspiration into lungs can produce severe lung damage and is a medical emergency. Other symptoms are expected to parallel inhalation.
Skin Contact:
Irritating due to defatting action on skin. Causes redness, pain, drying and cracking of the skin.
Eye Contact:
Vapors are irritating to the eyes. Splashes may cause severe irritation, with stinging, tearing, redness and pain.
Chronic Exposure:
Prolonged or repeated skin contact may produce severe irritation or dermatitis.
Aggravation of Pre-existing Conditions:
Use of alcoholic beverages enhances toxic effects. Exposure may increase the toxic potential of chlorinated hydrocarbons, such as chloroform, trichloroethane.

---

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:
Aspiration hazard. If swallowed, vomiting may occur spontaneously, but DO NOT INDUCE. If vomiting occurs, keep head below hips to prevent aspiration into lungs. Never give anything by mouth to an unconscious person. Call a physician immediately.
Skin Contact:

Immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get medical attention.

---

5. Fire Fighting Measures

Fire:

Flash point: -20C (-4F) CC
Autoignition temperature: 465C (869F)
Flammable limits in air % by volume:
lel: 2.5; uel: 12.8
Extremely Flammable Liquid and Vapor! Vapor may cause flash fire.

Explosion:

Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Vapors can flow along surfaces to distant ignition source and flash back. Contact with strong oxidizers may cause fire. Sealed containers may rupture when heated. This material may produce a floating fire hazard. Sensitive to static discharge.

Fire Extinguishing Media:

Dry chemical, alcohol foam or carbon dioxide. Water may be ineffective. Water spray may be used to keep fire exposed containers cool, dilute spills to nonflammable mixtures, protect personnel attempting to stop leak and disperse vapors.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

---

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB(R) solvent adsorbent is recommended for spills of this product.

---

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
Acetone:
-OSHA Permissible Exposure Limit (PEL):
1000 ppm (TWA)

-ACGIH Threshold Limit Value (TLV):
500 ppm (TWA), 750 ppm (STEL) A4 - not classifiable as a human carcinogen
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a half-face organic vapor respirator may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
Clear, colorless, volatile liquid.

Odor:
Fragrant, mint-like
Solubility:
Miscible in all proportions in water.
Specific Gravity:
0.79 @ 20C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
56.5C (133F) @ 760 mm Hg
Melting Point:
-95C (-139F)
Vapor Density (Air=1):
2.0
Vapor Pressure (mm Hg):
400 @ 39.5C (104F)
Evaporation Rate (BuAc=1):
ca. 7.7

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Concentrated nitric and sulfuric acid mixtures, oxidizing materials, chloroform, alkalis, chlorine compounds, acids, potassium t-butoxide.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

---

11. Toxicological Information

Oral rat LD50: 5800 mg/kg; Inhalation rat LC50: 50,100mg/m3; Irritation eye rabbit, Standard Draize, 20 mg severe; investigated as a tumorigen, mutagen, reproductive effector.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Acetone (67-64-1)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material is expected to readily biodegrade. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released into water, this material is expected to readily biodegrade. When released to water, this material is expected to quickly evaporate. This material has a log octanol-water partition coefficient of less than 3.0. This material is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material may be moderately degraded by photolysis. When released into the air, this material is expected to be readily removed from the atmosphere by wet deposition.
Environmental Toxicity:
This material is not expected to be toxic to aquatic life. The LC50/96-hour values for fish are over 100 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: ACETONE
Hazard Class: 3
UN/NA: UN1090
Packing Group: II
Information reported for product/size: 350LB

International (Water, I.M.O.)

Proper Shipping Name: ACETONE
Hazard Class: 3
UN/NA: UN1090
Packing Group: II
Information reported for product/size: 350LB

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\----------

Ingredient	TSCA	EC	Japan	Australia
Acetone (67-64-1)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\----------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Acetone (67-64-1)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Acetone (67-64-1)	No	No	Yes	No

--------\Federal, State & International Regulations - Part 2\----------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Acetone (67-64-1)	5000	U002	No

Chemical Weapons Convention: No TSCA 12(b): Yes CDTA: Yes
SARA 311/312: Acute: Yes Chronic: No Fire: Yes Pressure: No
Reactivity: No (Pure / Liquid)

Australian Hazchem Code: 2[Y]E
Poison Schedule: No information found.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **1** Flammability: **3** Reactivity: **0**
Label Hazard Warning:
DANGER! EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM.
Label Precautions:
Keep away from heat, sparks and flame.
Keep container closed.

Use only with adequate ventilation.
Wash thoroughly after handling.
Avoid breathing vapor.
Avoid contact with eyes, skin and clothing.

Label First Aid:

Aspiration hazard. If swallowed, vomiting may occur spontaneously, but DO NOT INDUCE. If vomiting occurs, keep head below hips to prevent aspiration into lungs. Never give anything by mouth to an unconscious person. Call a physician immediately. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.

Product Use:

Laboratory Reagent.

Revision Information:

No changes.

Disclaimer:

****

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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

Material Safety Data Sheet

Revision Issued: 8/23/99 Supercedes: 1/22/96 First Issued: 3/04/87

Section I - Chemical Product And Company Identification

Product Name: Acetone

CAS Number: 67-64-1 HBCC MSDS No. CA02000

HILL BROTHERS Chemical Co

1675 NORTH MAIN STREET • ORANGE, CALIFORNIA 92867-3499
(714) 998-8800 • FAX: (714) 998-8310
http://hillbrothers.com

1675 No. Main Street, Orange, California 92867
Telephone No: 714-998-8800 | Outside Calif: 800-821-7234 | Chemtrec: 800-424-9300

Section II - Composition/Information On Ingredients

			Exposure Limits (TWAs) in Air		
Chemical Name	CAS Number	%	ACGIH TLV	OSHA PEL	STEL
Acetone	67-64-1	100	750 ppm	750 ppm	1000 ppm
Benzene	71-43-2	0.0003	10 ppm	1 ppm	5 ppm

Section III - Hazard Identification

Routes of Exposure: Inhalation, skin absorption, ingestion, or eye contact.

Summary of Acute Health Hazards

Ingestion: Acetone has a low order of toxicity but is very irritating to mucous membranes. Ingestion of a toxic dose can cause gastroenteric irritation, narcosis and injury to the kidneys and liver. Aspiration into lungs can produce severe lung damage and is a medical emergency. Other symptoms are expected to parallel inhalation.

Inhalation: The vapor is irritating to mucous membranes. Vapor concentration of 2,500-3,000 ppm causes minor irritation of eyes, nose and throat. Inhalation of higher concentration may cause headache, nausea, confusion, drowsiness, convulsions and coma. Higher concentrations can produce central nervous system depression, narcosis, and unconsciousness.

Skin: Prolonged exposure to the vapor irritates the skin. Repeated and prolonged contact of the liquid with skin can cause dryness and erythema (inflammation).

Eyes: Eye contact with acetone is irritating and may be damaging.

Summary of Chronic Health Hazards: N/A

Effects of Overexposure: Acts as an anesthetic in very high concentrations. Headache, nausea, dizziness, and narcosis can result from excessive exposure to vapors. Causes severe eye irritation, experienced as discomfort or pain, excess blinking and tear production, with marked excess redness and swelling of the conjunctiva. Corneal injury may occur. Prolonged contact of the liquid with the skin can have a defatting action and may result in dermititus. Absorption through intact skin is not expected to cause systemic injury; however, possible skin absorption should be considered in meeting TLV requirements.

Medical Conditions Generally Aggravated by Exposure: Use of alcoholic beverages enhances toxic effects. Exposure may increase the toxic potential of chlorinated hydrocarbons, such as chloroform, trichloroethane.

Note to Physicians: Aspirated acetone may cause severe lung damage and present a significant hazard. Stomach contents should be evacuated quickly in a manner which avoids aspiration. Otherwise, treatment of overexposure is directed at the control of symptoms and the clinical condition of the patient. No specific antidote is known.

Section IV - First Aid Measures

Ingestion: Do not make an unconscious person vomit. If conscious give 2 glasses of water to dilute. DO NOT INDUCE

VOMITING. GET MEDICAL ATTENTION IMMEDIATELY. No specific antidote known. If vomiting occurs, keep head below hips to prevent aspiration into the lungs.

Inhalation: Remove to fresh air. Administer artificial respiration if breathing is irregular or stopped. If breathing is difficult, oxygen may be given by qualified personnel. GET MEDICAL ATTENTION.

Skin: Wash with large quantities of water and soap or a mild detergent. Remove contaminated clothing. Seek medical attention if irritation from contact persists.

Eyes: Flush eyes with water immediately for at least 15 minutes, lifting the upper and lower lids. GET MEDICAL ATTENTION, preferably from an opthalmologist.

Section V - Fire Fighting Measures

Flash Point: 0°F

Autoignition Temperature: 869°F

Lower Explosive Limit: 2.5

Upper Explosive Limit: 12.8

Unusual Fire and Explosion Hazards: Vapors form from this product and may travel or be moved by air currents and ignited by pilot lights, other flames, smoking, sparks, heaters, electrical equipment, static discharges or other ignition sources at locations distant from product handling point. Vapors from this material may settle in low or confined areas or tavel a long distance to an ignition source and flash back explosively. This material may produce a floating fire hazard.

Extinguishing Media: Small fire : Use carbon dioxide or dry chemical. Large fire: Use polar solvent (alcohol) type foam. The normal firefighting foams that are suitable for gasoline or hydrocarbon fires will break down and will not extinguish acetone fires. Water spray will reduce the intensity of flames. Acetone/water solutions have flash points when the acetone concentration is greater than 8% (by weight). The fire point, which is the percent by weight when a solution sustains a flame, is higher than that.

Special Firefighting Procedures: The use of self-contained breathing apparatus is recommended for fire fighters. Use water spray to cool fire-exposed containers and to dilute and reduce fire intensity. Use remote spray monitors or fight fire from behind shields. Use water spray to disperse vapors; re-ignition is possible.

Section VI - Accidental Release Measures

Provide maximum explosion-proof ventilation. Eliminate all sources of ignition. Flush spilled material into suitable retaining areas or containers with large quantities of water. Small amounts of spilled material may be absorbed into an appropriate absorbant.

Section VII - Handling and Storage

Handling and Storing Precautions: Store in a cool, clean, well-ventilated fireproof storage room or cabined to meet OSHA requirements. Sprinkler fire protection is needed in areas of storage, handling and use. Acetone must be stored and handled away from heat. Electrically interconnect and ground containers for all transfers of acetone to avoid fires from static sparks. Avoid breathing vapor.

Other Precautions: Transfer hazard: Vapors of this product may be ignited by static sparks. Use proper bonding and grounding during liquid transfer as described in National Fire Protection Association document NFPA 77.

Section VIII - Exposure Controls/Personal Protection

Respiratory Protection: Use only NIOSH- or MSHA -approved respirators. For a non-routine or emergency exposure above the TLV, use a full facepiece gas mask with organic vapor canister, or a air-supplied respirator in accordance with conditions. Use self-contained breathing apparatus in high vapor concentrations.

Respirator Selection

5,000 ppm: GMOVc* 20,000 ppm: GMOVfb/SAF/SCBAF* Escape: GMOV/SCBA* *see below

Ventilation: General mechanical ventilation may be sufficient to keep product vapor concentrations within specified time-weighted TLV ranges. Supplemental local exhaust may be required to maintain safe vapor concentrations.

Protective Clothing: Wear appropriate clothing to prevent repeated or prolonged skin contact. The use of impermeable gloves, aprons, boots, and lab coat are advised to prevent skin irritation.

Eye Protection: Safety glasses, chemical goggles, and/or face shields are recommended to safeguard against potential eye contact, irritation, or injury.

Other Protective Clothing or Equipment: Eye washes and safety showers should be readily available in the work areas.

Work/Hygienic Practices: Employees should wash promptly when skin is wet.

Section IX - Physical and Chemical Properties

Physical State: Liquid

pH: N/A

Melting Point/Range: -138°F (-94.7°C)

Boiling Point/Range: 133°F (56.5°C)

Appearance/Color/Odor: Clear, colorless liquid with a sweet, mint-like odor

Solubility in Water: Miscible in all proportions in water

Vapor Pressure(mmHg): 400 @ 104°F; (39.5°C)

Specific Gravity(Water=1): 0.791 @ 20°C

Molecular Weight: 58.08

Vapor Density(Air=1): 2.0

% Volatiles: 100%

How to detect this compound : N/A

Freezing Point: -96.54°C (-141.77°F)

Evaporation Rate (Butyl Acetate=1): Ca. 7.7

Section X - Stability and Reactivity

Stability: Stable

Hazardous Polymerization: Will not occur

Conditions to Avoid: Heat - acetone is a highly flammable material.

Materials to Avoid: Acetone is incompatible with strong oxidizing agents and strong acids or bases. Concentrated nitric and sulfuric acid mixtures, oxidizing materials, chloroform, alkalis, chlorine compounds, acids, potassium t-butoxide.

Hazardous Decomposition Products: Thermal decomposition in the presence of air may yield carbon monoxide and/or carbon dioxide.

Section XI - Toxicological Information

N/A

Section XII - Ecological Information

N/A

Section XIII - Disposal Considerations

Incineration is a recommended method to dispose of scrap acetone. Dispose of acetone in accordance with applicable local, county, state and federal regulations

Section XIV - Transport Information

DOT Proper Shipping Name: Acetone

DOT Hazard Class/ I.D. No.: 3,UN1090, II

Section XV - Regulatory Information

CALIFORNIA PROPOSITION 65: WARNING

This product contains trace levels of Benzene, Formaldehyde, and Acetaldehyde which the state of California has found to cause cancer.

Medical Surveillance Suggested: Preplacement examinations should evaluate skin and respiratory conditions. Acetone can be detected in the blood, urine, and expired air and has been used as an index of exposure.

Reportable Quantity: 5000 Lbs (2270 Kilograms) (753.01 Gals)

NFPA Rating: Health - 1; Fire - 3; Reactivity - 0

0=Insignificant 1=Slight 2=Moderate 3=High 4=Extreme

Carcinogenicity Lists: NTP: No **IARC Monograph:** No **OSHA Regulated:** Yes

Section 313 Supplier Notification: This product contains the following toxic chemcial(s) subject to the reporting requirements of SARA TITLE III Section 313 of the Emergency Planning and Community Right-To Know Act of 1986 and of 40 CFR 372:

CAS #	Chemical Name	% By Weight
67-64-1	Acetone	100%

Section XVI - Other Information

Synonyms/Common Names: Dimethyl Ketone, Propanone, 2-propanone, Dimethyl Ketal
Chemical Family/Type: Oxygenated Hydrocarbon, Ketone

IMPORTANT! Read this MSDS before use or disposal of this product. Pass along the information to employees and any other persons who could be exposed to the product to be sure that they are aware of the information before use or other exposure. This MSDS has been prepared according to the OSHA Hazard Communication Standard [29 CFR 1910.1200]. The MSDS information is based on sources believed to be reliable. However, since data, safety standards, and government regulations are subject to change and the conditions of handling and use, or misuse are beyond our control, **Hill Brothers Chemical Company** makes no warranty, either expressed or implied, with respect to the completeness or continuing accuracy of the information contained herein and disclaims all liability for reliance thereon. Also, additional information may be necessary or helpful for specific conditions and circumstances of use. It is the user's responsibility to determine the suitability of this product and to evaluate risks prior to use, and then to exercise appropriate precautions for protection of employees and others.

HOME PAGE

KERR-MCGEE CHEMICAL CORP -- AMMONIUM PERCHLORATE

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MSDS Safety Information

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FSC: 6810
NIIN: 01-354-7836
MSDS Date: 04/01/1992
MSDS Num: BNRMK
Product ID: AMMONIUM PERCHLORATE
MFN: 01
Responsible Party
Cage: 07083
Name: KERR-MCGEE CHEMICAL CORP
Address: 123 ROBERT S KERR AVE
Box: 25861
City: OKLAHOMA CITY OK 73125
Info Phone Number: 405-270-3047, 405-270-1313
Emergency Phone Number: 405-270-1313
Review Ind: Y
Published: Y

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Contractor Summary

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Cage: 0F8M0
Name: A AND B CHEMICAL AND EQUIPMENT CO
Address: 2931 2ND AVE SUITE 100
City: RICHMOND VA 23222
Phone: 804-329-3197
Cage: 07083
Name: KERR-MCGEE CHEMICAL CORP
Address: 123 ROBERT S KERR AVE
Box: 25861
City: OKLAHOMA CITY OK 73125
Phone: 405-270-1313
Cage: 94158
Name: KERR-MCGEE CHEMICAL CORP
Address: HENDERSON PLANT
Box: 55
City: HENDERSON NV 89015-0055
Phone: UNKNOWN

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Item Description Information

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Item Manager: S9G
Item Name: AMMONIUM PERCHLORATE,TECHNICAL
Unit of Issue: DR
Quantitative Expression: 00000000250LB
UI Container Qty: 1
Type of Container: DRUM

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Ingredients

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Cas: 7790-98-9
RTECS #: SC7520000
Name: AMMONIUM PERCHLORATE
% Wt: 100
Other REC Limits: 5MG/M3,AS RESP DUST
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED

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Health Hazards Data
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LD50 LC50 Mixture: 4200 MG/KG(RAT) & 1900MG/KG (RABBIT)
Route Of Entry Inds - Inhalation: YES
Skin: YES
Ingestion: NO
Carcinogenicity Inds - NTP: NO
IARC: NO
OSHA: NO
Effects of Exposure: AMMONIUM PERCHLORATE IS A MILD IRRITANT TO THE SKIN, EYES, MUCOUS MEMBRANES AND THE DIGESTIVE TRACT. CHRONIC INTAKE OF PERCHLORATE ION MAY HAVE A REVERSIBLE EFFECT ON THE THYROID GLAND.
Explanation Of Carcinogenicity: WARNING! THIS PRODUCT CONTAINS A CHEMICAL KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER (MSDS).
Signs And Symptions Of Overexposure: REDNESS OF THE EYES OR SKIN. IRRITATION OF MUCOUS MEMBRANES. DIGESTIVE TRACT IRRITATION OR DISORDER. SYMPTOMS OF HYPOTHYROIDISM (TIREDNESS, WEIGHT GAIN, DRY SKIN, FEELING COLD, CONSTIPATION, ETC.).
Medical Cond Aggravated By Exposure: EYE OR SKIN DISEASE, BREATHING OR RESPIRATORY DISORDERS AND DIGESTIVE TRACT DISORDERS WOULD BE AGGRAVATED BY EXPOSURE TO THIS CHEMICAL.
First Aid: EYES: FLUSH WITH LARGE AMOUNTS OF WATER. GET MEDICAL ATTENTION. SKIN: REMOVE CONTAMINATED CLOTHING. FLUSH AREA WITH LARGE AMOUNTS OF WATER AND THEN WASH WITH SOAP AND WATER. INHALATION: MOVE TO FRESH AIR. RESTORE BREATHING IF NECESSARY. GET MEDICAL ATTENTION IF SYMPTOMS PERSIST. INGESTION: GIVE TWO GLASSES OF WATER AND INDUCE VOMITING. GET MEDICAL ATTENTION.
==========
Handling and Disposal
==========
Spill Release Procedures: FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER NONCOMBUSTIBLE ABSORBENT MATERIAL AND PLACE IN METAL CONTAINERS FOR LATER DISPOSAL. FOR LARGE SPILLS, DIKE THE SPILL AREA FOR LATER DISPOSAL.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Methods: DISPOSE OF WASTE IN ACCORDANCE WITH ALL LOCAL, STATE AND FEDERAL REGULATIONS.
Handling And Storage Precautions: STORE SEPARATELY AND KEEP FROM CONTACT WITH INCOMPATABLE MATERIALS. STORE IN ORIGINAL TIGHTLY CLOSED CONTAINER. KEEP AWAY FROM FIRE.
Other Precautions: DO NOT SMOKE WHEN HANDLING THIS MATERIAL. DO NOT DROP, SKID OR SLIDE CONTAINERS. PROVIDE WATER FILLED JUMP TANK AND SAFETY SHOWER. DO NOT USE A FIRE BLANKET IF CLOTHING CATCHES FIRE, USE JUMP TANK OR SAFETY SHOWER.
==========
Fire and Explosion Hazard Information
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Extinguishing Media: USE WATER FOR FIRES.
Fire Fighting Procedures: WEAR NIOSH-APPROVED SELF-CONTAINED BREATHING APPARATUS. COOL CONTAINERS EXPOSED TO FLAMES WITH WATER FROM SIDE UNTIL WELL AFTER FIRE IS OUT.
Unusual Fire/Explosion Hazard: DANGER! STRONG OXIDIZER. CONTACT WITH COMBUSTIBLES OR OXIDIZABLE MATERIAL CONSTITUTES AN EXTREME FIRE AND EXPLOSION HAZARD.
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Control Measures
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Respiratory Protection: USE NIOSH APPROVED DUST MASK APPROPRIATE FOR NUISANCE DUST.
Ventilation: PROVIDE LOCAL EXHAUST/GENERAL VENTILATION SYSTEM.DO NOT ALLOW ACCUMULATION OF DUST ON PIPES,STRUCTURAL MEMBERS/WALKWAYS.
Protective Gloves: IMPERVIOUS
Eye Protection: SAFETY GLASSES OR GOGGLES

Other Protective Equipment: PROVIDE EYE WASH STATION AND SAFETY SHOWER OR JUMP TANK IN WORK AREA. WEAR WASHABLE CLOTHING AND RUBBER BOOTS OR SHOES.
Work Hygienic Practices: WASH AFTER HANDLING AND BEFORE EATING, DRINKING, OR SMOKING. LAUNDER CONTAMINATED CLOTHING BEFORE REUSE.
Supplemental Safety and Health: DO NOT SMOKE WHEN HANDLING. CLOTHING AND ORGANIC MATERIALS CONTAMINATED WITH AMMONIUM PERCHLORATE OR ITS SOLUTIONS ARE DANGEROUSLY FLAMMABLE. DO NOT WEAR LEATHER SHOES, GLOVES OR BELTS. IF LEATHER IS INADVERTENTLY CONTAMINATED, DO NOT REUSE; DISCARD AS HAZARDOUS, FLAMMABLE ARTICLES.

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Physical/Chemical Properties

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HCC: D1
M.P/F.P Text: DECOMPOSES
Decomp Text: 450F,232C
Spec Gravity: 1.95
Solubility in Water: 20%
Appearance and Odor: WHITE GRANULAR CRYSTALS. ODORLESS
Corrosion Rate: UNKNOWN

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Reactivity Data

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Stability Indicator: YES
Stability Condition To Avoid: STABLE IN PURE FORM BELOW 65.5C (150F). DECOMPOSES AT HIGHER TEMPERATURES.
Materials To Avoid: AVOID CONTACT WITH FLAMMABLE/COMBUSTIBLES, OXIDIZABLE MATERIALS, EXPLOSIVES, ACIDS, SULFUR,PHOSPHORUS AND METAL POWDERS.
Hazardous Decomposition Products: THERMAL DECOMPOSITION MAY RELEASE TOXIC AND HAZARDOUS FUMES OF CHLORINE,HYDROGEN CHLORIDES,AMMONIA,OXIDES OF NITROGEN.
Hazardous Polymerization Indicator: NO

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Toxicological Information

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Ecological Information

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MSDS Transport Information

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Regulatory Information

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Other Information

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Transportation Information

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Responsible Party Cage: 07083
Trans ID NO: 128734
Product ID: AMMONIUM PERCHLORATE
MSDS Prepared Date: 04/01/1992
Review Date: 09/02/1992
MFN: 1
Net Unit Weight: 250 LBS
Multiple KIT Number: 0
Review IND: Y
Unit Of Issue: DR
Container QTY: 1
Type Of Container: DRUM

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Detail DOT Information
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DOT PSN Code: ASD
DOT Proper Shipping Name: AMMONIUM PERCHLORATE
Hazard Class: 5.1
UN ID Num: UN1442
DOT Packaging Group: II
Label: OXIDIZER
Special Provision: 107,A9
Non Bulk Pack: 212
Bulk Pack: 242
Max Qty Pass: 5 KG
Max Qty Cargo: 25 KG
Vessel Stow Req: E
Water/Ship/Other Req: 58,69,106
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Detail IMO Information
==========
IMO PSN Code: AZZ
IMO Proper Shipping Name: AMMONIUM PERCHLORATE
IMDG Page Number: 5126
UN Number: 1442
UN Hazard Class: 5.1
IMO Packaging Group: II
Subsidiary Risk Label: -
EMS Number: 5.1-09
MED First Aid Guide NUM: 745
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Detail IATA Information
==========
IATA PSN Code: BQC
IATA UN ID Num: 1442
IATA Proper Shipping Name: AMMONIUM PERCHLORATE
IATA UN Class: 5.1
IATA Label: OXIDIZER
UN Packing Group: II
Packing Note Passenger: 509
Max Quant Pass: 5KG
Max Quant Cargo: 25KG
Packaging Note Cargo: 512
Exceptions: A22
==========
Detail AFI Information
==========
AFI PSN Code: BQC
AFI Proper Shipping Name: AMMONIUM PERCHLORATE
AFI Hazard Class: 5.1
AFI UN ID NUM: UN1442
AFI Packing Group: II
Special Provisions: P5, 107, A9
Back Pack Reference: A9.8
==========
HAZCOM Label
==========
Product ID: AMMONIUM PERCHLORATE
Cage: 07083
Company Name: KERR-MCGEE CHEMICAL CORP
Street: 123 ROBERT S KERR AVE
PO Box: 25861

City: OKLAHOMA CITY OK
Zipcode: 73125
Health Emergency Phone: 405-270-1313
Label Required IND: Y
Date Of Label Review: 07/23/1993
Status Code: C
Label Date: 07/23/1993
Origination Code: F
Chronic Hazard IND: Y
Eye Protection IND: YES
Skin Protection IND: YES
Signal Word: CAUTION
Respiratory Protection IND: YES
Health Hazard: Slight
Contact Hazard: Slight
Fire Hazard: None
Reactivity Hazard: None
Hazard And Precautions: AMMONIUM PERCHLORATE IS A MILD IRRITANT TO THE SKIN, EYES, MUCOUS MEMBRANES AND THE DIGESTIVE TRACT. CHRONIC INTAKE OF PERCHLORATE ION MAY HAVE A REVERSIBLE EFFECT ON THE THYROID GLAND. STORE SEPARATE LY AND KEEP FROM CONTACT WITH INCOMPATABLE MATERIALS. KEEP AWAY FROM FIRE. FIRST AID: EYES: FLUSH WITH LARGE AMOUNTS OF WATER. GET MEDICAL ATTENTION. SKIN: REMOVE CONTAMINATED CLOTHING. FLUSH AREA WIT H LARGE AMOUNTS OF WATER AND THEN WASH WITH SOAP AND WATER. INHALATION: MOVE TOFRESH AIR. RESTORE BREATHING IF NECESSARY. GET MEDICAL ATTENTION IF SYMPTOMS PERSIST. INGESTION: GIVE TWO GLASSES OF WATE R AND INDUCE VOMITING. GET MEDICAL ATTENTION.

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Disclaimer (provided with this information by the compiling agencies): This information is formulated for use by elements of the Department of Defense. The United States of America in no manner whatsoever expressly or implied warrants, states, or intends said information to have any application, use or viability by or to any person or persons outside the Department of Defense nor any person or persons contracting with any instrumentality of the United States of America and disclaims all liability for such use. Any person utilizing this instruction who is not a military or civilian employee of the United States of America should seek competent professional advice to verify and assume responsibility for the suitability of this information to their particular situation regardless of similarity to a corresponding Department of Defense or other government situation.

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

ANILINE

MSDS Number: A6660 — *Effective Date: 11/02/01*

1. Product Identification

Synonyms: Aminobenzene; aniline oil; phenylamine; aniline technical special
CAS No.: 62-53-3
Molecular Weight: 93.12
Chemical Formula: C6H5NH2
Product Codes: J.T. Baker: 9110
Mallinckrodt: 3583, 3584, 4378

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Aniline	62-53-3	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! MAY BE FATAL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. COMBUSTIBLE LIQUID AND VAPOR. MAY CAUSE METHEMOGLOBINEMIA. AFFECTS BLOOD, CARDIOVASCULAR SYSTEM,

CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Cancer Causing)
Flammability Rating: 2 - Moderate
Reactivity Rating: 2 - Moderate
Contact Rating: 3 - Severe (Life)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Toxic. Affects ability of blood to carry oxygen. Symptoms may include bluish discoloration of lips and tongue, severe headache, nausea, confusion, dizziness, shock, respiratory paralysis, death.
Ingestion:
Toxic. Lethal dose may be as little as one gram. Symptoms of ingestion parallel those of inhalation exposure.
Skin Contact:
May be absorbed through skin. Symptoms of skin absorption parallel those from inhalation exposure. May cause skin irritation. Local contact may cause dermatitis.
Eye Contact:
Vapor is an eye irritant. May cause tearing, blurred vision. Splashes may cause corneal damage.
Chronic Exposure:
Aniline is a blood toxin, causing hemoglobin to convert to methemoglobin, resulting in cyanosis. Lengthy or repeated exposures may result in decreased appetite, anemia, weight loss, nervous system affects, and kidney, liver and bone marrow damage. Any exposure may cause an allergic skin reaction.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems or impaired liver or kidney function may be more susceptible to the effects of the substance. A NIOSH study reported an excess bladder cancer risk in workers exposed to aniline in combination with other dyestuffs and intermediates, although it is not clear which of these materials, or combinations, were responsible for the higher incidence of bladder cancer. Based on the results of this study , historical epidemiology evidence which shows no correlation of pure aniline with bladder cancer, and experimental test results, it was concluded that aniline, most likely, is not responsible for the increased incidence of bladder tumors in the NIOSH study.

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4. First Aid Measures

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Do not give mouth to mouth resuscitation. CALL A PHYSICIAN IMMEDIATELY.

Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

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5. Fire Fighting Measures

Fire:
Flash point: 70C (158F) CC
Autoignition temperature: 615C (1139F)
Flammable limits in air % by volume:
lel: 1.3; uel: 11.0
Combustible liquid and vapor. Flammable when exposed to heat or flame. Contact with strong oxidizers may cause fire or explosion.

Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Sealed containers may rupture when heated.

Fire Extinguishing Media:
Dry chemical, foam, carbon dioxide, or water spray.

Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Use water spray to blanket fire, cool fire exposed containers, and to flush non-ignited spills or vapors away from fire.

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6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Protect from freezing. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL): 5 ppm (TWA) skin
-ACGIH Threshold Limit Value (TLV): 2 ppm (TWA) skin
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Breathing air quality must meet the requirements of the OSHA respiratory protection standard (29CFR1910.134).
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.
Other Control Measures:
Provide clean work clothes daily to workers who regularly use this material. Wash hands before eating and do not eat, drink, or smoke in workplace.

9. Physical and Chemical Properties

Appearance:
Colorless, oily liquid. Darkens on exposure to light or air.
Odor:

Weakly amine.
Solubility:
3.5 gm in 100 gm water @ 20C (68F).
Specific Gravity:
1.022 @ 68F (20C)
pH:
8.1 (0.2 M solution)
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
184C (363F)
Melting Point:
-6.2C (21F)
Vapor Density (Air=1):
3.22
Vapor Pressure (mm Hg):
0.6 @ 20C (68F)
Evaporation Rate (BuAc=1):
< 1

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Discolors on exposure to light.
Hazardous Decomposition Products:
Burning may produce carbon monoxide, carbon dioxide, nitrogen oxides.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Strong acids and strong oxidizers, albumin, solutions of iron, zinc, aluminum, toluene diisocyanate, and alkalis. Ignites spontaneously in the presence of red fuming nitric acid, and with sodium.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Oral rat LD50: 250 mg/kg; skin rabbit LD50: 820 mg/kg; inhalation mouse LC50: 175 ppm (7 hours); irritation skin rabbit: 20 mg/24H moderate; irritation eye rabbit 102 mg severe. Investigated as a tumorigen, mutagen, and reproductive effector. Carcinogenic determination: limited evidence in experimental animals (IARC 27, 54, 1982). Aniline is listed by the International Agency for Research on Cancer (IARC) in Category 3, i. e., "Cannot be classified as to its carcinogenicity in humans." (IARC, Supplement 4, 1982).

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--------\Cancer Lists\-----------------------------------------------------
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Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Aniline (62-53-3)	No	No	3

12. Ecological Information

Environmental Fate:
When released into the soil, this material is expected to readily biodegrade. When released into the soil, this material may leach into groundwater. When released into the soil, this material may evaporate to a moderate extent. When released into water, this material is expected to readily biodegrade. When released into water, this material is expected to have a half-life between 10 and 30 days. This material has an experimentally-determined bioconcentration factor (BCF) of less than 100. This material is not expected to significantly bioaccumulate. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to be readily degraded by photolysis. When released into the air, this material is expected to have a half-life of less than 1 day. When released into the air, this material is not expected to adversely affect the ozone layer.
Environmental Toxicity:
This material is expected to be very toxic to terrestrial life. This material is expected to be very toxic to aquatic life. The LC50/96-hour values for fish are between 10 and 100 mg/l. The EC50/48-hour values for daphnia are less than 1 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: ANILINE
Hazard Class: 6.1
UN/NA: UN1547
Packing Group: II
Information reported for product/size: 4L

International (Water, I.M.O.)

Proper Shipping Name: ANILINE
Hazard Class: 6.1
UN/NA: UN1547
Packing Group: II
Information reported for product/size: 4L

International (Air, I.C.A.O.)

Proper Shipping Name: ANILINE
Hazard Class: 6.1
UN/NA: UN1547
Packing Group: II
Information reported for product/size: 4L

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15. Regulatory Information

--------\Chemical Inventory Status - Part 1\--------

Ingredient	TSCA	EC	Japan	Australia
Aniline (62-53-3)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\--------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Aniline (62-53-3)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\--------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Aniline (62-53-3)	5000	1000	Yes	No

--------\Federal, State & International Regulations - Part 2\--------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Aniline (62-53-3)	5000	U012	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: Yes
SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
Reactivity: No (Pure / Liquid)

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: 3X
Poison Schedule: S6
WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

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16. Other Information

NFPA Ratings: Health: **3** Flammability: **2** Reactivity: **0**
Label Hazard Warning:
DANGER! MAY BE FATAL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. COMBUSTIBLE LIQUID AND VAPOR. MAY CAUSE METHEMOGLOBINEMIA. AFFECTS BLOOD, CARDIOVASCULAR SYSTEM, CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS.
Label Precautions:
Do not breathe vapor.
Do not get in eyes, on skin, or on clothing.
Keep away from heat and flame.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Label First Aid:
In all cases call a physician immediately. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. IF INHALED, remove to fresh air. If not breathing, give artificial respiration. DO NOT GIVE MOUTH-TO-MOUTH RESUSCITATION. If breathing is difficult, give oxygen. Keep patient warm and at rest.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 8.
Disclaimer:
****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

----------Record 32 ----------
NSN: 9150-00-190-0932
LSN:
RESPONSIBLE PARTY CAGE: 58565
PRODUCT ID: BRAKE FLUID
MFN: 01
MSDS DATE: 11/05/1987
SUBMITTER SERVICE: D
SUBMITTER ACTIVITY: DG
TECH REVIEW: 03/21/1991
STATUS CD: C
REVIEW IND: Y
PROPRIETARY IND: N
EDI: N
SPECIAL PROJECT CD: N
PUBLISHED: Y
FSC: 9150
NIIN: 00-190-0932
LIIN:
MSDS SERIAL NUM: BLJGJ
ARTICLE: N
KIT PART: N
ARCHIVE IND: N
RESP PARTY COMPANY NAME: DAVIS HOWLAND
RESP PARTY STREET ADDRESS: 200 ANDERSON AVENUE
RESP PARTY P.O. BOX:
RESP PARTY CITY: ROCHESTER
RESP PARTY STATE: NY
RESP PARTY ZIP CODE: 14607
RESP PARTY COUNTRY: US
RESP PARTY INFO PHONE NO: 716-473-6650
RESP PARTY EMERGENCY PHONE: 716-473-6650
RESP PARTY OTHER MSDS NUMBER:
PREPARER'S NAME: DGCS-SSH
CHEMTREC IND/PHONE:
CONTRACTOR CAGE: 58565
CONTRACTOR ASSIGNED IND: N
CONTRACTOR COMPANY NAME: DAVIS HOWLAND
CONTRACTOR STREET ADDRESS: UNKNOWN
CONTRACTOR P.O. BOX:
CONTRACT CITY: UNKNOWN
CONTRACTOR STATE: NK
CONTRACTOR ZIP CODE: 00000
CONTRACTOR COUNTRY: US
CONTRACTOR PHONE: UNKNOWN
CONTRACT NUMBER:
CONTRACTOR CAGE: 5A565
CONTRACTOR ASSIGNED IND: N
CONTRACTOR COMPANY NAME: DAVIS HOWLAND OIL CORP. BOUGHT BY SUPERIOR
CONTRACTOR STREET ADDRESS: 200 ANDERSON AVE.
CONTRACTOR P.O. BOX: N/K
CONTRACT CITY: ROCHESTER
CONTRACTOR STATE: NY
CONTRACTOR ZIP CODE: 14607
CONTRACTOR COUNTRY: US
CONTRACTOR PHONE: 716-473-6650
CONTRACT NUMBER:
ITEM MANAGER: S9G
ITEM NAME: BRAKE FLUID,AUTOMOTIVE
SPECIFICATION NUMBER: VV-B-680
TYPE/GRADE/CLASS: 1 SIZE

UNIT OF ISSUE: PT
QUANTITATIVE EXPRESSION: NK
UI CONTAINER QTY: 1 PINT
TYPE OF CONTAINER: PPP-C-96
CAS:
CAS CODE: X
RTECS NUMBER: 1000675GE
RTECS CODE: M
INGREDIENT NAME: GLYCOL ETHER
% TEXT: N/K
ENVIRONMENTAL WEIGHT %:
OSHA PEL: NOT ESTABLISHED
OSHA PEL CODE: M
OTHER REC LIMITS: NONE SPECIFIED
OSHA STEL:
OSHA STEL CODE:
ACGIH TLV: NOT ESTABLISHED
ACGIH TLV CODE: M
ACGIH STEL: N/P
ACGIH STEL CODE:
CAS:
CAS CODE: X
RTECS NUMBER: 1001317GL
RTECS CODE: M
INGREDIENT NAME: GLYCOL - TYPE NOT SPECIFIED
% TEXT: N/K
ENVIRONMENTAL WEIGHT %:
OSHA PEL: NOT ESTABLISHED
OSHA PEL CODE: M
OTHER REC LIMITS: NONE SPECIFIED
OSHA STEL:
OSHA STEL CODE:
ACGIH TLV: NOT ESTABLISHED
ACGIH TLV CODE: M
ACGIH STEL: N/P
ACGIH STEL CODE:
LD50 LC50 MIXTURE: LD50 (ORAL RAT) IS >5 G/KG
ROUTE OF ENTRY INDS-INHALATION: YES
ROUTE OF ENTRY INDS-SKIN: YES
ROUTE OF ENTRY INDS-INGESTION: NO
HEALTH HAZ ACUTE AND CHRONIC: MAY CAUSE SKIN, EYE AND MUCOUS MEMBRANE IRRITATION.
CARCINOGENICITY INDS - NTP: NO
CARCINOGENICITY INDS - IARC: NO
CARCINOGENICITY INDS - OSHA: NO
EXPLANATION CARCINOGENICITY: NONE OF THE COMPOUNDS IN THIS PRODUCT IS LISTED BY IARC, NTP, OR OSHA AS A CARCINOGEN.
SIGNS/SYMPTOMS OVEREXPOSURE: SEE HEALTH HAZARDS.
MED COND AGGRAVATED BY EXP: NONE SPECIFIED BY MANUFACTURER.
FIRST AID: INHALATION-REMOVE TO FRESH AIR. RESUSCITATE IF NOT BREATHING. GET MEDICAL ATTENTION. EYES-IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR 15 MINUTES HOLDING EYELIDS OPEN. GET MEDICAL ATTENTION. SKIN-WASH WITH SOAP AND WATER. IF IRRITATION PERSIS TS, GET MEDICAL ADVICE. INGESTION-IMMEDIATELY DRINK WATER TO DILUTE.
SPILL RELEASE PROCEDURES: ISOLATE AREA OF SPILL BY DIKING. STOP SOURCE OF LEAK. TRANSFER CONTENTS TO NON-LEAKING CONTAINER OR STORAGE VESSEL. ADD DRY ABSORBENT, SHOVEL OR SWEEP UP. PLACE IN AN APPROPRIATE CONTAINER AND SEAL.
NEUTRALIZING AGENT: NOT APPLICABLE.
WASTE DISPOSAL METHODS: DISPOSAL SHOULD BE MADE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL LAWS AND REGULATIONS.

HANDLING/STORAGE PRECAUTIONS: STORE IN A COOL, DRY, WELL VENTILATED AREA. STORAGE TANKS SHOULD BE ELECTRICALLY GROUNDED AND EQUIPPED WITH VENT AND FLAME ARRESTER.
OTHER PRECAUTIONS: DO NOT TAKE INTERNALLY. DO NOT BREATHE MIST. AVOID PROLONGED OR REPEATED BREATHING OF VAPOR. AVOID CONTACT WITH EYES. AVOID CONTACT WITH OXIDIZING AGENTS.
FLASH PT METHOD: N/P
FLASH PT:
FLASH POINT TEXT: 240F,116C
AUTOIGNITION TEMP:
AUTOIGNITION TEMP TEXT: N/A
LOWER LIMITS: N/K
UPPER LIMITS: N/K
EXTINGUISHING MEDIA: WATER SPRAY, DRY CHEMICAL, ALCOHOL FOAM OR CARBON DIOXIDE.
FIRE FIGHTING PROCEDURES: WEAR FIRE FIGHTING PROTECTIVE EQUIPMENT AND A FULL FACED SELF CONTAINED BREATHING APPARATUS. COOL FIRE EXPOSED CONTAINERS WITH WATER SPRAY. CONTAIN RUNOFF.
UNUSUAL FIRE/EXPLOSION HAZARD: NONE NOTED
RESPIRATORY PROTECTION: IF VENTILATION DOES NOT MAINTAIN INHALATION EXPOSURES BELOW PEL(TLV), USE NIOSH/MSHA APPROVED ORGANIC VAPOR CARTRIDGE AND DUST/MIST PRE-FILTER RESPIRATORS AS PER CURRENT 29 CFR 1910.134, INSTRUCTIONS/WARNINGS AND NIOSH-RESPIRATOR SELECTION.
VENTILATION: MECHANICAL (GENERAL) ROOM VENTILATION IS NORMALLY ADEQUATE. LOCAL EXHAUST MAY BE REQUIRED IF WORK AREA NOT VENTED.
PROTECTIVE GLOVES: IMPERVIOUS
EYE PROTECTION: GOGGLES
OTHER PROTECTIVE EQUIPMENT: EYE WASH STATION AND SAFETY SHOWER. INDUSTRIAL- TYPE WORK CLOTHING AND APRON AS REQUIRED.
WORK HYGENIC PRACTICES: OBSERVE GOOD PERSONAL HYGIENE PRACTICES AND RECOMMENDED PROCEDURES. DO NOT WEAR CONTAMINATED CLOTHING OR FOOTWEAR.
SUPPLEMENTAL SAFETY & HEALTH: AVOID PROLONGED OR REPEATED EXPOSURE. DO NOT GET ON SKIN OR IN EYES. DO NOT BREATHE VAPORS OR MISTS.
HCC: V6
NRC/STATE LIC NO: N/R
NET PROP WT FOR AMMO: N/R
BOILING POINT:
B.P. TEXT: 460F,238C
MELT/FREEZE PT:
M.P/F.P TEXT: <-60F,<-51C
DECOMP TEMP:
DECOMP TEXT: UNKNOWN
VAPOR PRES: N/K
VAPOR DENSITY: N/K
SPEC GRAVITY: 1.08
VOLATILE ORG CONTENT %:
VOC GRAMS/LITER:
VOC POUNDS/GALLON:
PH: 9.5
VISCOSITY: N/R
EVAPORATION RATE & REFERENCE: N/K
SOLUBILITY IN WATER: COMPLETE
APPEARANCE AND ODOR: CLEAR TO YELLOW LIQUID
PERCENT VOLATILES BY VOLUME: N/K
CORROSION RATE: UNKNOWN
STABILITY INDICATOR: YES
STABILITY CONDITIONS TO AVOID: EXCESS HEAT.
MATERIALS TO AVOID:
STRONG OXIDIZING AGENTS, STRONG ACIDS, STRONG ALKALIS.
HAZARDOUS DECOMPOSITION PRODUCTS CARBON MONOXIDE, CARBON DIOXIDE AND OXIDES OF NITROGEN.
HAZARDOUS POLYMERIZATION INDICAT NO

ORIGINAL (Red)

CONDITIONS TO AVOID POLYMERIZATI NOT APPLICABLE
TOXICOLOGICAL INFORMATION: N/P
ECOLOGICAL INFORMATION: N/P
TRANSPORT INFORMATION: N/P
SARA TITLE III: N/P
FEDERAL REGULATORY: N/P
STATE REGULATORY INFORMATION: N/P
OTHER INFORMATION: N/P
TRANS RESPONSIBLE PARTY CAGE: 58565
PRODUCT ID: BRAKE FLUID
MSDS PREPARED DATE: 11/05/1987
REVIEW DATE: 11/21/1991
TRANS MFN: 1
TRANS SUBMITTER SERVICE: D
TRANS SUBMITTER ACTIVITY: DG
TRANS STATUS CD: C
TRANS ID NO: 55673
ARTICLE W/O MSDS: N
TECH ENTRY NOS SHIPPING NAME:
RADIOACTIVITY: N/R
FORM:
NET EXPLOSIVE WEIGHT: N/R
COAST GUARD AMMO CODE: N/R
MAGNETISM: N/P
NET UNIT WEIGHT: 1.12 LBS.
AF MMAC CODE: NR
DOD EXEMPTION NUM: N/R
LIMITED QUANTITY IND:
MULTIPLE KIT NUMBER: 0
KIT INDICATOR: N
KIT PART INDICATOR: N
REVIEW INDICATOR: Y
TRANS UNIT OF ISSUE: PT
CONTAINER QTY: 1 PINT
TYPE OF CONTAINER: PPP-C-96
ADDITIONAL DATA:
DOT PSN CODE: ZZZ
SYMBOLS: N/R
DOT PROPER SHIPPING NAME: NOT REGULATED BY THIS MODE OF TRANSPORTATION
DOT PSN MODIFIER:
HAZARD CLASS: N/R
UN ID NUM: N/R
DOT PACKAGING GROUP: N/R
LABEL: N/R
SPECIAL PROVISION: N/R
PACKAGING EXCEPTION: N/R
NON BULK PACK: N/R
BULK PACK: N/R
MAX QTY PASS: N/R
MAX QTY CARGO: N/R
VESSEL STOW REQ: N/R
WATER/SHIP/OTHER REQ: N/R
IMO PSN CODE: ZZZ
IMO PROPER SHIPPING NAME: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IMO PSN MODIFIER:
IMDG PAGE NUMBER: N/R
UN NUMBER: N/R
UN HAZARD CLASS: N/R
IMO PACKAGING GROUP: N/R
SUBSIDIARY RISK LABEL: N/R
EMS NUMBER: N/R

ORIGINAL (Red)

MED FIRST AID GUIDE NUM: N/R
IATA PSN CODE: ZZZ
IATA UN ID NUM: N/R
IATA PROPER SHIPPING NAME: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IATA PSN MODIFIER:
IATA UN CLASS: N/R
SUBSIDIARY RISK CLASS: N/R
IATA LABEL: N/R
UN PACKAGING GROUP: N/R
PACKAGING NOTE PASSENGER: N/R
MAX QUANT PASS: N/R
PACKAGING NOTE CARGO: N/R
MAX QUANT CARGO: N/R
EXCEPTIONS: N/R
AFI PSN CODE: ZZZ
AFI SYMBOLS:
AFI PROPER SHIPPING NAME: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI PSN MODIFIER:
AFI HAZARD CLASS: N/R
AFI UN ID NUM: N/R
AFI PACKAGING GROUP: N/R
AFI LABEL: N/R
SPECIAL PROVISIONS: N/A
BASIC PACK REFERENCE: N/A
LABEL PRODUCT ID: BRAKE FLUID
LABEL CAGE: 58565
ASSIGNED IND: N
LABEL COMPANY NAME: DAVIS HOWLAND
LABEL STREET: UNKNOWN
LABEL P.O. BOX:
LABEL CITY: UNKNOWN
LABEL STATE: NK
LABEL ZIP CODE: 00000
LABEL COUNTRY: US
HEALTH EMERGENCY PHONE NUM: 716-473-6650
LABEL REQUIRED IND: Y
DATE OF LABEL REVIEW: 03/21/1991
STATUS CODE: C
MFG LABEL NO: N/R
LABEL DATE: 03/21/1991
YEAR PROCURED: N/K
ORIGINATION CODE: F
CHRONIC HAZARD IND: N/P
EYE PROTECTION IND: YES
SKIN PROTECTION IND: YES
RESPIRATORY PROTECTION IND: N/P
SIGNAL WORD: CAUTION
HEALTH HAZARD: None
CONTACT HAZARD: Slight
FIRE HAZARD: Slight
REACTIVITY HAZARD: None
HAZARD AND PRECAUTIONS: MAY CAUSE SKIN, EYE AND MUCOUS MEMBRANE IRRITATION. STORE IN A COOL, DRY, WELL VENTILATED AREA. STORAGE TANKS SHOULD BE ELECTRICALLY GROUNDED AND EQUIPPED WITH VENT AND FLAME ARRESTER. FIRST AID: INHALATION:REMOVE TO FRESH AIR. RESUSCITATE IF NOT BREATHI
G. GET MEDICAL ATTENTION. EYES:IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR 15 MINUTES HOLDING EYELIDS OPEN. GET MEDICAL ATTENTION. SKIN: WASH WITH SOAP AND WATER. IF IRRITATION PERSISTS, GET MEDICAL ADVICE. INGESTION: IMMEDIA TELY DRINK WATER TO DILUTE.

ORIGINAL

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

MSDS Name: Carbon Tetrachloride, 99%
Catalog Numbers:
AC148170000, AC148170010, AC148170025, AC148170250
Synonyms:
Tetrachloromethane; Benziform; Carbona; Carbon Chloride; Methane Tetrachloride.
Company Identification (Europe): Acros Organics BVBA
Janssen Pharmaceuticalaan 3a
2440 Geel, Belgium
Company Identification (USA): Acros Organics
One Reagent Lane
Fairlawn, NJ 07410
For information in North America, call: 800-ACROS-01
For information in Europe, call: 0032(0) 14575211
For emergencies in the US, call CHEMTREC: 800-424-9300
For emergencies in Europe, call: 0032(0) 14575299

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#
56-23-5	Carbon Tetrachloride	99	200-262-8

Hazard Symbols: T N
Risk Phrases: 23/24/25 40 59 48/23

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

Appearance: clear, colorless.
Warning! Cancer suspect agent. Causes digestive tract irritation. May cause central nervous system effects. May cause liver and kidney damage. Causes eye and skin irritation. Causes severe respiratory tract irritation. May cause cancer based on animal studies. May cause fetal effects.
Target Organs: Kidneys, central nervous system, liver.

Potential Health Effects

Eye:
May cause eye irritation. May cause temporary visual impairment.

Skin:
May cause skin irritation. Prolonged and/or repeated contact may cause irritation and/or dermatitis.

Ingestion:
Causes gastrointestinal irritation with nausea, vomiting and diarrhea. May cause liver and kidney damage. May cause central nervous system depression, characterized by excitement, followed by headache, dizziness, drowsiness, and nausea. Advanced stages may cause collapse, unconsciousness, coma and possible death due to respiratory failure. May cause tremors and convulsions. May cause effects similar to those of acute inhalation. Substance is a hepatotoxin and is capable of producing a toxic effect on the liver.

Inhalation:
May cause liver and kidney damage. May cause adverse central nervous system effects including headache, convulsions, and possible death.

May cause heart disturbances, possibly leading to cardiac arrest and death. May cause liver abnormalities. May cause cardiac abnormalities.

Chronic:

Chronic exposure to organic solvents has been associated with various neurotoxic effects including permanent brain and nervous system damage. Chronic ingestion may cause effects similar to those of acute ingestion. May cause cancer according to animal studies. Chronic exposure may cause visual disturbances.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:

Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

Skin:

Flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists. Wash clothing before reuse.

Ingestion:

If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.

Inhalation:

Get medical aid immediately. Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

Notes to Physician:

Treat symptomatically and supportively.

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:

As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Containers may explode in the heat of a fire. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas.
Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes.

Extinguishing Media:

Do NOT get water inside containers. Do NOT use straight streams of water. For small fires, use dry chemical, carbon dioxide, or water spray. For large fires, use water spray, fog or regular foam. Cool containers with flooding quantities of water until well after fire is out.

Autoignition Temperature:Not available.
Flash Point: Not available.
Explosion Limits, lower:Not available.
Explosion Limits, upper:Not available.
NFPA Rating:

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks:

Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Remove all sources of ignition. Provide ventilation. Do not get water inside containers.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:
Wash thoroughly after handling. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Do not ingest or inhale. Use only in a chemical fume hood.

Storage:
Do not store in direct sunlight. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Do not store near alkaline substances.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:
Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use only under a chemical fume hood.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Carbon Tetrachloride	5 ppm; 10 ppm STEL; skin - potential for cutaneous absorption	NIOSH Potential Occupational Carcinogen - see Appendix A Potential NIOSH carcinogen.	10 ppm TWA; C 25 ppm

OSHA Vacated PELs:
Carbon Tetrachloride:
2 ppm TWA; 12.6 mg/m3 TWA

Personal Protective Equipment

Eyes:
Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin:
Wear polyvinyl chloride gloves, apron, and/or clothing. Wear appropriate protective gloves to prevent skin exposure.

Clothing:
Wear polyvinyl chloride gloves, apron, and/or clothing. Wear appropriate protective clothing to minimize contact with skin.

Respirators:
Follow the OSHA respirator regulations found in 29CFR 1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator

when necessary.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State:	Liquid
Appearance:	clear, colorless
Odor:	ethereal odor
pH:	Not available.
Vapor Pressure:	121 mbar @ 20 C
Vapor Density:	5.32
Evaporation Rate:	12.8 (butyl acetate=1)
Viscosity:	0.97 PAS 20 deg C
Boiling Point:	76 deg C @ 760.00mm Hg
Freezing/Melting Point:	-23 deg C
Decomposition Temperature:	>100 deg C
Solubility in water:	soluble in ethanol, ether and acetone
Specific Gravity/Density:	1.5940g/cm3
Molecular Formula:	CCl4
Molecular Weight:	153.82

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Stable under normal temperatures and pressures.
Conditions to Avoid:
Mechanical shock, incompatible materials, light, excess heat.
Incompatibilities with Other Materials:
Aluminum, bromine trifluoride, calcium hypochlorite, dimethyl formamide, ethylene oxide, fluorine, lithium, magnesium, potassium, potassium-tert-butoxide, silver perchlorate, sodium, uranium, chlorine trifluoride, dinitrogen tetraoxide, methanol.
Hazardous Decomposition Products:
Hydrogen chloride, chlorine, phosgene, carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 56-23-5: FG4900000
LD50/LC50:
CAS# 56-23-5: Dermal, guinea pig: LD50 = >9400 uL/kg; Draize test, rabbit, eye: 2200 ug/30S Mild; Draize test, rabbit, eye: 500 mg/24H Mild; Draize test, rabbit, skin: 4 mg Mild; Draize test, rabbit, skin: 500 mg/24H Mild; Inhalation, mouse: LC50 = 9526 ppm/8H; Inhalation, rat: LC50 = 8000 ppm/4H; Oral, mouse: LD50 = 8263 mg/kg; Oral, rabbit: LD50 = 5760 mg/kg; Oral, rat: LD50 = 2350 mg/kg; Skin, rabbit: LD50 = >20 gm/kg; Skin, rat: LD50 = 5070 mg/kg.
Carcinogenicity:
Carbon Tetrachloride -
ACGIH: A2 - Suspected Human Carcinogen
California: carcinogen; initial date 10/1/87
NIOSH: occupational carcinogen
NTP: Suspect carcinogen
OSHA: Possible Select carcinogen
IARC: Group 2B carcinogen
Epidemiology:
Carcinogenic in experimental animals and is a suspected human carcinogen.

Teratogenicity:
No information available.
Reproductive Effects:
May cause fetal effects based animal studies.
Neurotoxicity:
No infirmation available.
Mutagenicity:
No data available.
Other Studies:
Experimental reproductive effects.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Other
No information available.

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste.
US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: CAS# 56-23-5: waste number U211.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT
Shipping Name: RQ,CARBON TETRACHLORIDE
Hazard Class: 6.1
UN Number: UN1846
Packing Group: II
Canadian TDG
Shipping Name: CARBON TETRACHLORIDE
Hazard Class: 6.1(9.2)
UN Number: UN1846

**** SECTION 15 - REGULATORY INFORMATION ****

US FEDERAL
TSCA
CAS# 56-23-5 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA
Section 302 (RQ)
CAS# 56-23-5: final RQ = 10 pounds (4.54 kg)
Section 302 (TPQ)
None of the chemicals in this product have a TPQ.
SARA Codes

CAS # 56-23-5: acute, chronic.

Section 313

This material contains Carbon Tetrachloride (CAS# 56-23-5, 99%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 372.

Clean Air Act:

CAS# 56-23-5 is listed as a hazardous air pollutant (HAP).
CAS# 56-23-5 is listed as a Class 1 ozone depletor with an ODP = 1.1; GWP = 1400; commodity code 2903.14.0000
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

CAS# 56-23-5 is listed as a Hazardous Substance under the CWA.
CAS# 56-23-5 is listed as a Priority Pollutant under the Clean Water Act.
CAS# 56-23-5 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

Carbon Tetrachloride can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.
The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:
WARNING: This product contains Carbon Tetrachloride, a chemical known to the state of California to cause cancer.
California No Significant Risk Level:
CAS# 56-23-5: no significant risk level = 5 ug/day

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: T N

Risk Phrases:

R 23/24/25 Toxic by inhalation, in contact with skin and if swallowed.
R 40 Possible risks of irreversible effects.
R 59 Dangerous for the ozone layer.
R 48/23 Toxic : danger of serious damage to health by prolonged exposure through inhalation.

Safety Phrases:

S 53 Avoid exposure - obtain special instructions before use.
S 23 Do not inhale gas/fumes/vapour/spray.
S 36/37 Wear suitable protective clothing and gloves.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 59 Refer to manufacturer/supplier for information on recovery/recycling.
S 61 Avoid release to the environment. Refer to special instructions/Safety data sheets.

WGK (Water Danger/Protection)

CAS# 56-23-5: 3

United Kingdom Occupational Exposure Limits

CAS# 56-23-5: OES-United Kingdom, TWA 2 ppm TWA; 13 mg/m3 TWA

Canada

CAS# 56-23-5 is listed on Canada's DSL List.
This product has a WHMIS classification of D1A, D2A.

CAS# 56-23-5 is listed on Canada's Ingredient Disclosure List.

Exposure Limits

CAS# 56-23-5: OEL-ARAB Republic of Egypt:TWA 5 ppm (30 mg/m3);Skin
OEL-AUSTRALIA:TWA 5 ppm (30 mg/m3);Skin;Carcinoge
OEL-BELGIUM:TWA 5 ppm (31 mg/m3);Skin;Carcinogen
OEL-CZECHOSLOVAKIA:TWA 10 mg/m3;STEL 20 mg/m3
OEL-DENMARK:TWA 2 ppm (13 mg/m3);Skin
OEL-FINLAND:TWA 5 ppm (31 mg/m3);STEL 10 ppm (63 mg/m3);Skin;CAR
OEL-FRANCE:TWA 2 ppm (12 mg/m3);STEL 10 ppm (60 mg/m3)
OEL-GERMANY:TWA 10 ppm (65 mg/m3);Skin;Carcinogen
OEL-HUNGARY:STEL 10 mg/m3;Skin;Carcinogen
OEL-INDIA:TWA 5 ppm (30 mg/m3);Skin;Carcinogen
OEL-JAPAN:TWA 10 ppm (63 mg/m3);Skin;Carcinogen
OEL-THE NETHERLANDS:TWA 2 ppm (12.6 mg/m3);Skin
OEL-THE PHILIPPINES:TWA 10 ppm (65 mg/m3);Skin
OEL-POLAND:TWA 20 mg/m3
OEL-RUSSIA:TWA 10 ppm;STEL 20 mg/m3
OEL-SWEDEN:TWA 2 ppm (13 mg/m3);STEL 3 ppm (19 mg/m3);Skin;CAR
OEL-SWITZERLAND:TWA 5 ppm (30 mg/m3);STEL 10 ppm (60 mg/m3);Skin
OEL-THAILAND:TWA 10 ppm;STEL 25 ppm
OEL-UNITED KINGDOM:TWA 10 ppm (65 mg/m3);STEL 20 ppm;Skin
OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV
OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

**** SECTION 16 - ADDITIONAL INFORMATION ****

MSDS Creation Date: 7/20/1999 Revision #2 Date: 8/02/2000

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if the company has been advised of the possibility of such damages.

OCTAGON PROCESS INC. -- DECONTAMINATING AGENT, ETHYLENE OXIDE

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MSDS Safety Information

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FSC: 6850
NIIN: 00-775-3704
MSDS Date: 10/28/1991
MSDS Num: BLFBZ
Product ID: DECONTAMINATING AGENT, ETHYLENE OXIDE
MFN: 01
Responsible Party
Cage: 82925
Name: OCTAGON PROCESS INC.
Address: 596 RIVER ROAD
City: EDGEWATER NJ 07020-1105
Info Phone Number: 201-945-9400
Emergency Phone Number: 201-945-9400
Preparer's Name: DGSC-SSH
Review Ind: Y
Published: Y

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Preparer Co. when other than Responsible Party Co.

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Cage: 82925
Name: OCTAGON PROCESS INC.
Address: 596 RIVER ROAD
City: EDGEWATER NJ 07020

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Contractor Summary

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Cage: 82925
Name: OCTAGON PROCESS INC.
Address: 596 RIVER ROAD
City: EDGEWATER NJ 07020
Phone: 201-945-9400

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Item Description Information

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Item Manager: S9G
Specification Number: MIL-D-22365A
Unit of Issue: CN
UI Container Qty: G
Type of Container: AEROSOL CAN

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Ingredients

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Cas: 75-71-8
RTECS #: PA8200000
Name: DICHLORODIFLUOROMETHANE (SARA III) (55% OF PROPELLANT)
% Wt: 55 %
Other REC Limits: NONE SPECIFIED
OSHA PEL: 1000 PPM
ACGIH TLV: 1000 PPM; 9192
EPA Rpt Qty: 5000 LBS
DOT Rpt Qty: 5000 LBS
Ozone Depleting Chemical: 1

Cas: 75-69-4
RTECS #: PB6125000
Name: TRICHLOROFLUOROMETHANE (CFC-11) (SARA III) (45 % OF PROPELLANT)

% Wt: 45 %
Other REC Limits: NONE SPECIFIED
OSHA PEL: 1000 PPM
ACGIH TLV: C, 1000 PPM; 9293
EPA Rpt Qty: 5000 LBS
DOT Rpt Qty: 5000 LBS
Ozone Depleting Chemical: 1

Cas: 75-21-8
RTECS #: KX2450000
Name: ETHYLENE OXIDE (SARA III)
% Wt: 12 %
Other REC Limits: NONE SPECIFIED
OSHA PEL: 1 PPM; SEE 1910.1047
ACGIH TLV: 1 PPM, A2; 9192
EPA Rpt Qty: 10 LBS
DOT Rpt Qty: 10 LBS
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Health Hazards Data
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LD50 LC50 Mixture: NOT SPECIFIED BY MANUFACTURER.
Route Of Entry Inds - Inhalation: YES
Skin: NO
Ingestion: NO
Carcinogenicity Inds - NTP: NO
IARC: NO
OSHA: NO
Effects of Exposure: CENTRAL NERVOUS SYSTEM DISTURBANCES, GASTROINTESTINAL DISTURBANCES
Explanation Of Carcinogenicity: THIS COMPOUND CONTAINS NO INGREDIENTS AT CONCENTRATIONS OF 0.1% OR GREATER THAT ARE CARCINOGENS OR SUSPECT CARCINOGENS.
Signs And Symptions Of Overexposure: MAY CAUSE DIZZINESS, NAUSEA, VOMITING, DISORIENTATION, CONFUSION, INCOORDINATION, NARCOSIS, REAPIRATORY TRACT IRRITATION.
Medical Cond Aggravated By Exposure: NONE SPECIFIED BY MANUFACTURER.
First Aid: IN CASE OF INGESTION, GIVE AT LEAST TWO GLASSES OF WATER. DO NOT INDUCE VOMITING. CALL A PHYSICIAN. IN CASE OF SKIN CONTACT, REMOVE CONTAMINATED CLOTHING. WASH WITH SOAP AND WATER. IN CASE OF INHALATI ON, REMOVE TO FRESH AIR. IN CASE OF EYECONTACT, FLUSH WITH WATER AND CONTINUE FOR AT LEAST 15 MINUTES. SEE A PHYSICIAN.
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Handling and Disposal
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Spill Release Procedures: WIPE UP SMALL SPILLS WITH PAPER TOWEL. WEAR GLOVES, GOGGLES & RESPIRATOR. VENTILATE AREA. DO NOT BREATHE VAPOR. ELIMINATE IGNITION SOURCES.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Methods: DISPOSAL OF WASTE AND HAZARDOUS MATERIAL SHALL COMPLY WITH LOCAL, STATE AND FEDERAL ENVIRONMENTAL PROTECTION AGENCY REGULATIONS. SEND WASTE MATERIAL TO AN APPROVED RECYCLING FACILITY IF FEASIBLE. CITY , STATE AND FEDERAL REGULATIONS MUST BEFOLLOWED.
Handling And Storage Precautions: WARNING: LIQUIFIED GAS MIXTURE UNDER PRESSURE. DO NOT BREATHE VAPOR. CAN CAUSE SUFFOCATION DUE TO OXYGEN DEFICIENCY. DO NOT GIVE ADRENALIN.
Other Precautions: AVOID CONTACT WITH EYES, SKIN AND/OR CLOTHING.
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Fire and Explosion Hazard Information
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Flash Point Text: NONFLAMMABLE

Lower Limits: NONFLAMMABLE
Upper Limits: NONFLAMMABLE
Extinguishing Media: USE MEDIA SUITABLE FOR SURROUNDING FIRE.
Fire Fighting Procedures: FIRE FIGHTERS SHOULD USE SHIELDING TO PROTECT AGAINST BURSTING OR VENTING CONTAINERS. CONTENTS UNDER PRESSURE. USE WATER SPRAY TO COOL NEARBY CONTAINERS.
Unusual Fire/Explosion Hazard: FIRE OR EXCESSIVE HEAT MAY CAUSE PRODUCTION OF HAZARDOUS DECOMPOSITION PRODUCTS. CONTENTS UNDER PRESSURE.

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Control Measures

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Respiratory Protection: WEAR A NIOSH/MSHA APPROVED CHEMICAL CARTRIDGE RESPIRATOR WITH FULL FACEPIECE AND ORGANIC VAPOR CARTRIDGES IN COMBINATION WITH A HIGH-EFFICIENCY PARTICULATE FILTER.
Ventilation: LOCAL AND MECHANICAL(GENERAL) EXHAUST TO PROVIDE ADEQUATE VENTILATION.
Protective Gloves: NEOPRENE OR NITRILE RUBB11SEP91AN 685000
Eye Protection: N01818126921A PRODUCTS OF COMBUSTION ARE
Other Protective Equipment: TOXIC. AVOID BREATHING SMOKE.
NO NOT RELEVANT.
Work Hygienic Practices: LD50:(ORAL,RAT) >5 G/KG
Supplemental Safety and Health: YESNO NO IN A XEROX SPONSORED CHRONIC INHAL STUDY IN RATS USING A SPECIAL TONER, THERE WERE NO LUNG CHANGES AT ALL IN THE LOWEST EXPOSURE LEVEL (1 MG/M3), THE MOST RELEVANT LEVEL TO POTENTIAL HUMAN EX POS. A VERY SLIGHT DEGREE OF FIBROSIS WAS NOTED IN 25% OF THE ANIMALS AT THE MIDDLE EXPOS LEVEL (4 MG/M

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Physical/Chemical Properties

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HCC: V2
B.P. Text: 51.8F,11.0C
M.P/F.P Text: -168F,-111C
Decomp Text: UNKNOWN
Vapor Density: HEAVIER
Spec Gravity: 1.24
Evaporation Rate & Reference: > 1 (BUTYL ACETATE = 1)
Solubility in Water: MODERATE
Appearance and Odor: COLORLESS GAS, SWEET, OLEFINIC ODOR SUSPENDED IN AEROSOL SPRAY CAN
Percent Volatiles by Volume: 100 %
Corrosion Rate: UNKNOWN

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Reactivity Data

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Stability Indicator: YES
Stability Condition To Avoid: HIGH HEAT, OPEN FLAMES AND OTHER SOURCES OF IGNITION. DO NOT PUNCTURE CANS.
Materials To Avoid: STRONG OXIDIZING AGENTS
Hazardous Decomposition Products: CARBON MONOXIDE AND CARBON DIOXIDE
Hazardous Polymerization Indicator: NO
Conditions To Avoid Polymerization: NONE. WILL NOT OCCUR.

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Toxicological Information

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Ecological Information

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MSDS Transport Information

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Regulatory Information
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Other Information
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Transportation Information
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Responsible Party Cage: 82925
Trans ID NO: 85082
Product ID: DECONTAMINATING AGENT, ETHYLENE OXIDE
MSDS Prepared Date: 10/28/1991
Review Date: 10/29/1991
MFN: 1
Tech Entry NOS Shipping Nm: DICHLORODIFLUOROMETHANE, TRICHLOROFLUOROMETHANE
Multiple KIT Number: 0
Review IND: Y
Unit Of Issue: CN
Container QTY: G
Type Of Container: AEROSOL CAN
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Detail DOT Information
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DOT PSN Code: AGD
DOT Proper Shipping Name: AEROSOLS, NON-FLAMMABLE,
DOT PSN Modifier: (EACH NOT EXCEEDING 1 L CAPACITY)
Hazard Class: 2.2
UN ID Num: UN1950
Label: NONFLAMMABLE GAS
Non Bulk Pack: NONE
Bulk Pack: NONE
Max Qty Pass: 75 KG
Max Qty Cargo: 150 KG
Vessel Stow Req: A
Water/Ship/Other Req: 48,85
==========
Detail IMO Information
==========
IMO PSN Code: AIY
IMO Proper Shipping Name: AEROSOL DISPENSERS ?
IMO PSN Modifier: ,WITH A CAPACITY OF 1000 CUBIC CM OR LESS
IMDG Page Number: 9022
UN Number: 1950
UN Hazard Class: 9?
IMO Packaging Group: -
Subsidiary Risk Label: -
EMS Number: 2-13
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Detail IATA Information
==========
IATA PSN Code: ANB
IATA UN ID Num: 1950
IATA Proper Shipping Name: AEROSOLS, NON-FLAMMABLE
IATA PSN Modifier: (EACH NOT EXCEEDING 1 L CAPACITY)
IATA UN Class: 2.2
IATA Label: NON-FLAMMABLE GAS
Packing Note Passenger: 203
Max Quant Pass: 75 KG
Max Quant Cargo: 150KG

Packaging Note Cargo: 203

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Detail AFI Information

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AFI PSN Code: HDO
AFI Symbols: *
AFI Proper Shipping Name: COMPRESSED GAS, N.O.S.
AFI Hazard Class: 2.2
AFI UN ID NUM: UN1956
Special Provisions: P5
Back Pack Reference: A6.3, A6.5,A6.6

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HAZCOM Label

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Product ID: DECONTAMINATING AGENT, ETHYLENE OXIDE
Cage: 82925
Company Name: OCTAGON PROCESS INC.
Street: 596 RIVER ROAD
City: EDGEWATER NJ
Zipcode: 07020
Health Emergency Phone: 201-945-9400
Label Required IND: Y
Date Of Label Review: 10/29/1991
Status Code: C
MFG Label NO: NONE
Label Date: 10/29/1991
Year Procured: 1967
Origination Code: F
Eye Protection IND: YES
Skin Protection IND: YES
Signal Word: CAUTION
Respiratory Protection IND: YES
Health Hazard: Slight
Contact Hazard: Slight
Fire Hazard: Slight
Reactivity Hazard: None
Hazard And Precautions: WARNING: LIQUIFIED GAS MIXTURE UNDER PRESSURE. DO NOT BREATHE VAPOR. CAN CAUSE SUFFOCATION DUE TO OXYGEN DEFICIENCY. DO NOT GIVE ADRENALIN. FIRST AID: IN CASE OF INGESTION, GIVE AT LEAST TWO GLASSES O F WATER. DO NOT INDUCE VOMITING. CALL APHYSICIAN. IN CASE OF SKIN CONTACT, REMOVE CONTAMINATED CLOTHING. WASH WITH SOAP AND WATER. IN CASE OF INHALATION, REMOVE TO FRESH AIR. IN CASE OF EYE CONTACT, F LUSH WITH WATER AND CONTINUE FOR AT LEAST 15 MINUTES. SEE A PHYSICIAN.

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Fisher Scientific CANADA
A Fisher Scientific International Company

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

MSDS Name: Furfuryl Alcohol, 99%
Catalog Numbers:
AC181120000, AC181120010, AC181120025, AC181122500
Synonyms:
2-Furancarbinol; 2-Furanmethanol; Furfural alcohol; Furfuralcohol; Furyl alcohol;alpha-Furylcarbinol; 2-Furylcarbinol; 2-Furylmethanol; 2-Hydroxymethylfuran; Methanol, (2-furyl)-

Company Identification (Europe): Acros Organics BVBA
Janssen Pharmaceuticalaan 3a
2440 Geel, Belgium
Company Identification (USA): Acros Organics
One Reagent Lane
Fairlawn, NJ 07410
For information in North America, call: 800-ACROS-01
For information in Europe, call: 0032(0) 14575211
For emergencies in the US, call CHEMTREC: 800-424-9300
For emergencies in Europe, call: 0032(0) 14575299

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#
98-00-0	Furfuryl alcohol	99	202-626-1

Hazard Symbols: XN
Risk Phrases: 20/21/22

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

Appearance: clear, colorless to pale yellow liquid. Flash Point: 75 deg C.
Danger! Combustible liquid and vapor. Causes skin irritation. Air sensitive. May cause central nervous system depression. Causes digestive and respiratory tract irritation. Harmful if swallowed, inhaled, or absorbed through the skin. Causes eye irritation and possible injury.
Target Organs: Kidneys, central nervous system.

Potential Health Effects

Eye:
Vapors cause eye irritation.

Skin:
Causes skin irritation. Harmful if absorbed through the skin.

Ingestion:
Harmful if swallowed. Causes gastrointestinal irritation with nausea, vomiting and diarrhea. May cause central nervous system depression, characterized by excitement, followed by headache, dizziness, drowsiness, and nausea. Advanced stages may cause

collapse, unconsciousness, coma and possible death due to respiratory failure. Effects may be delayed 2 to 4 hours.

Inhalation:
Harmful if inhaled. Effects of inhalation may be delayed. Vapor or mist is irritating to the mucous membranes and upper respiratory tract. Inhalation may produce severe bronchitis with spasms, coughing, and chest pain.

Chronic:
Overexposure may cause delayed kidney injury. Prolonged or repeated skin contact may cause dermatitis. Prolonged exposure to high vapor concentrations may cause eye injury.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:
Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately.

Skin:
Get medical aid immediately. Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes.

Ingestion:
Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.

Inhalation:
Get medical aid immediately. Remove from exposure to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.

Notes to Physician:
Effects may be delayed. Persons with pre-existing skin disorders or eye problems, or impaired liver, kidney, or respiratory function may be more susceptible to the effects of this substance.

Antidote:
None reported.

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:
As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors can travel to a source of ignition and flash back. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Combustible Liquid. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Containers may explode when heated. Forms explosive mixtures with air.

Extinguishing Media:
Use water spray to cool fire-exposed containers. Use foam, dry chemical, or carbon dioxide. Cool containers with flooding quantities of water until well after fire is out.

Autoignition Temperature:491 deg C (915.80 deg F)
Flash Point: 75 deg C (167.00 deg F)
Explosion Limits, lower:1.80 vol %
Explosion Limits, upper:16.30 vol %
NFPA Rating: (estimated) Health: 1; Flammability: 2; Reactivity: 1

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks:

Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Wash area with soap and water. Clean up spills immediately, observing precautions in the Protective Equipment section. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation. Place under an inert atmosphere.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:

Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Do not breathe dust, vapor, mist, or gas. Do not get in eyes, on skin, or on clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Avoid contact with heat, sparks and flame. Do not ingest or inhale. Handle under an inert atmosphere. Store protected from air. Use only in a chemical fume hood. Store and handle protected from air. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.

Storage:

Keep away from sources of ignition. Do not store in direct sunlight. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Do not expose to air. Storage under a nitrogen blanket has been recommended. Store under an inert atmosphere. Keep away from organic acids.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:

Use explosion-proof ventilation equipment. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use only under a chemical fume hood.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Furfuryl alcohol	10 ppm; 15 ppm STEL; skin - potential for cutaneous absorption	10 ppm TWA; 40 mg/m3 TWA 75 ppm IDLH	50 ppm TWA; 200 mg/m3 TWA

OSHA Vacated PELs:

Furfuryl alcohol:

10 ppm TWA; 40 mg/m3 TWA; 15 ppm STEL; 60 mg/m3 STEL

Personal Protective Equipment

Eyes:

Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face

protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin:
Wear appropriate protective gloves to prevent skin exposure.

Clothing:
Wear appropriate protective clothing to prevent skin exposure.

Respirators:
A respiratory protection program that meets OSHA's 29 CFR :1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant a respirator's use.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State:	Liquid
Appearance:	clear, colorless to pale yellow liquid.
Odor:	faint, burning
pH:	Not available.
Vapor Pressure:	0.5 mm Hg @ 20C
Vapor Density:	3.37 (Air=1)
Evaporation Rate:	Not available.
Viscosity:	Not available.
Boiling Point:	171 deg C
Freezing/Melting Point:	-31 deg C
Decomposition Temperature:	
Solubility in water:	miscible
Specific Gravity/Density:	1.129
Molecular Formula:	C5H6O2
Molecular Weight:	98.10

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Stable under normal temperatures and pressures. Substance undergoes color change upon exposure to air. May undergo polymerization in contact with organic acids. May undergo a color change due to autoxidation and intermolecular dehydration during storage.

Conditions to Avoid:
Incompatible materials, ignition sources, exposure to air, excess heat.

Incompatibilities with Other Materials:
Acids, strong oxidizing agents, air, acid chlorides, organic acids, oxygen, fuming nitric acid.

Hazardous Decomposition Products:
Carbon monoxide, irritating and toxic fumes and gases, carbon dioxide.

Hazardous Polymerization: May occur.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 98-00-0: LU9100000

LD50/LC50:
CAS# 98-00-0: Draize test, rabbit, eye: 100 mg/24H Moderate; Inhalation, rat: LC50 = 233 ppm/4H; Oral, mouse: LD50 = 160 mg/kg; Oral, rat: LD50 = 177 mg/kg; Skin, rabbit: LD50 = 400 mg/kg; Skin, rat: LD50 = 3825 mg/kg.

Carcinogenicity:
Furfuryl alcohol -
Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
Epidemiology:
No data available.
Teratogenicity:
No data available.
Reproductive Effects:
No data available.
Neurotoxicity:
No data available.
Mutagenicity:
DNA Repair: Bacillus subtilis = 2 mg/disc.; Cytogenetic Analysis: Hamster, Ovary = 2500 umol/L.
Other Studies:
No data available.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Ecotoxicity:
If released to soil, it will be expected to exhibit very high mobility, based upon the reported infinite solubility of the compound in water and an estimated Koc of 34. It may, therefore, leach through soil to groundwater if it does not biodegrade or otherwise decompose first. It may be subject to biodegradation in soil based upon results observed in a laboratory aqueous aerobic biodegradation screening test. Volatilization from moist near surface soil is not expected. However, it may volatilize from dry near surface soil and other dry surfaces based upon its vapor pressure.

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste.
US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT
Shipping Name: FURFURYL ALCOHOL
Hazard Class: 6.1
UN Number: UN2874
Packing Group: III
Canadian TDG
Shipping Name: FURFURYL ALCOHOL
Hazard Class: 6.1
UN Number: UN2874

**** SECTION 15 - REGULATORY INFORMATION ****

US FEDERAL
TSCA
CAS# 98-00-0 is listed on the TSCA inventory.

Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.

SARA
Section 302 (RQ)
None of the chemicals in this material have an RQ.
Section 302 (TPQ)
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 98-00-0: acute, flammable, reactive.
Section 313
No chemicals are reportable under Section 313.

Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.

STATE
Furfuryl alcohol can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.
California No Significant Risk Level:
None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols: XN
Risk Phrases:
R 20/21/22 Harmful by inhalation, in contact with skin and if swallowed.
Safety Phrases:
S 16 Keep away from sources of ignition - No smoking.
S 23 Do not inhale gas/fumes/vapour/spray.
S 24/25 Avoid contact with skin and eyes.
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 36/37/39 Wear suitable protective clothing, gloves and eye/face protection.

WGK (Water Danger/Protection)
CAS# 98-00-0: 1

United Kingdom Occupational Exposure Limits
CAS# 98-00-0: OES-United Kingdom, TWA 5 ppm TWA; 20 mg/m3 TWA
CAS# 98-00-0: OES-United Kingdom, STEL 15 ppm STEL; 61 mg/m3 STEL

Canada
CAS# 98-00-0 is listed on Canada's DSL List.
This product has a WHMIS classification of B3, D1A, D2B.

CAS# 98-00-0 is listed on Canada's Ingredient Disclosure List.

Exposure Limits

CAS# 98-00-0: OEL-AUSTRALIA:TWA 10 ppm (40 mg/m3);STEL 15 ppm (60 mg/m 3);Skin
OEL-BELGIUM:TWA 10 ppm (40 mg/m3);STEL 15 ppm (60 mg/m3);Skin
OEL-DENMARK:TWA 5 ppm (20 mg/m3);Skin
OEL-FINLAND:TWA 5 ppm (20 mg/m3);STEL 10 ppm (40 mg/m3);Skin
OEL-FRANCE:TWA 10 ppm (40 mg/m3)
OEL-GERMANY:TWA 50 ppm (200 mg/m3)
OEL-HUNGARY:STEL 8 mg/m3;Skin
OEL-JAPAN:TWA 5 ppm (20 mg/m3)
OEL-THE NETHERLANDS:TWA 5 ppm (20 mg/m3);STEL 50 ppm;Skin
OEL-THE PHILIPPINES:TWA 50 ppm (200 mg/m3)
OEL-RUSSIA:TWA 5 ppm;STEL 0.5 mg/m3;Skin
OEL-SWEDEN:TWA 5 ppm (20 mg/m3);STEL 10 ppm (40 mg/m3)
OEL-SWITZERLAND:TWA 10 ppm (40 mg/m3);Skin
OEL-TURKEY:TWA 50 ppm (200 mg/m3)
OEL-UNITED KINGDOM:TWA 5 ppm (20 mg/m3);STEL 15 ppm;Skin
OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV
OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

**** SECTION 16 - ADDITIONAL INFORMATION ****

MSDS Creation Date: 5/20/1999 Revision #2 Date: 8/02/2000

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if the company has been advised of the possibility of such damages.

DOWELL SCHLUMBERGER -- INHIBITED RED FUMING NITRIC ACID L61

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MSDS Safety Information

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FSC: 6810
MSDS Date: 09/25/1991
MSDS Num: CCSPP
LIIN: 00N075082
Product ID: INHIBITED RED FUMING NITRIC ACID L61
MFN: 01
Responsible Party
Cage: F0294
Name: DOWELL SCHLUMBERGER
Box: 2710
City: TULSA OK 74101
Info Phone Number: 918-582-0104
Emergency Phone Number: 918-582-0104
Preparer's Name: W.W. SHEPHERD
Published: Y

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Contractor Summary

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Cage: DXWEL
Name: DOWELL SCHLUMBERGER
Address: UNKNOWN
Box: UNKNOW
City: UNKNOWN NK 00000
Phone: UNKNOWN
Cage: F0294
Name: DOWELL SCHLUMBERGER
Box: 21
City: TULSA OK 74102
Phone: (918) 582-0104

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Ingredients

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Cas: 7697-37-2
RTECS #: QU5775000
Name: NITRIC ACID; (HNO3) (SARA 302/313) (CERCLA)
OSHA PEL: 2 PPM
ACGIH TLV: 2 PPM; 4 STEL
EPA Rpt Qty: 1000 LBS
DOT Rpt Qty: 1000 LBS

Cas: 10544-72-6
RTECS #: QX1575000
Name: NITROGEN TETROXIDE; (NITROGEN DIOXIDE) (NO2) (CERCLA)
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)
EPA Rpt Qty: 10 LBS
DOT Rpt Qty: 10 LBS

Cas: 7664-39-3
RTECS #: MW7875000
Name: HYDROFLUORIC ACID; (HYDROGEN FLUORIDE) (HF) (SARA 302/313) (CERCLA)
% Wt: <1
OSHA PEL: 3 PPM (F)
ACGIH TLV: 3 PPM (F) C
EPA Rpt Qty: 100 LBS
DOT Rpt Qty: 100 LBS

Cas: 7732-18-5
RTECS #: ZC0110000
Name: WATER; (H*2O)
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)
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Health Hazards Data
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LD50 LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.
Route Of Entry Inds - Inhalation: YES
Skin: YES
Ingestion: YES
Carcinogenicity Inds - NTP: NO
IARC: NO
OSHA: NO
Effects of Exposure: EYES: CORROSIVE. RAPIDLY CAUSES PAIN, BURNS, CORNEAL INJURY. MAY CAUSE PERMANENT DAMAGE & BLINDNESS. SKIN: TOXIC. CORROSIVE. CAN CAUSE ILLNESS OR DEATH. RAPIDLY CAUSES BURNS, TISSUE DAMAGE & PAIN. ING EST: TOXIC. CORROSIVE. CAUSES PAIN & SEVERE BURNS TO MOUTH, THROAT & STOMACH. CAN CAUSE ILLNESS/DEATH. (EFTS OF OVEREXP)
Explanation Of Carcinogenicity: NOT RELEVANT
Signs And Symptions Of Overexposure: HLTH HAZ: INHAL: TOXIC. CORROSIVE. VERY DANGEROUS. POOR WARNING PROPERTIES. MAY CAUSE COUGHING, DIFFICULT BREATHING, PULMONARY EDEMA & DEATH. EFFECTS MAY NOT APPEAR FOR SEVERAL HOURS OR A FEW DAYS AFT ER EXPOSURE. OTHER: 50 PPM AS VAPOR IS IRRITATING TO EYES & NOSE. ODOR IS PERCEPTIBLE FOR MOST PERSONS AT 0.22 PPM.
Medical Cond Aggravated By Exposure: NONE SPECIFIED BY MANUFACTURER.
First Aid: EYES: IMMED FLUSH EYES W/WATER FOR 30 MIN WHILE HOLDING EYELIDS OPEN. SEE MD AT ONCE. SKIN: IMMED WASH W/SOAP & WATER FOR 30 MIN. SEE MD AT ONCE. DESTROY CONTAMD SHOES & CLTHG. INGEST: DO NOT INDUCE V OMIT. DRINK LG QTYS OF MILK (PREFERRED)OR WATER & GIVE MILK OF MAGNESIA. TAKE TO HOSPITAL AT ONCE. INHAL: REMOVE TO FRESH AIR. SEE MD AT ONCE. IF BRTHG HAS STOPPED, BEGIN ARTF RESP. NOTES: (SUPDAT)
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Handling and Disposal
==========
Spill Release Procedures: CONTAIN W/DIKES. DILUTE WITH WATER. NEUTRALIZE WITH SODA ASH OR LIME. PUT IN STEEL DRUM (PLASTIC DRUM IF ACIDIC). NOT BIODEGRADABLE. TOXIC TO FISH. DO NOT ALLOW TO ENTER WATERWAY.
Neutralizing Agent: NEUTRALIZE WITH SODA ASH OR LIME.
Waste Disposal Methods: NEUTRALIZED MATERIAL IS GENERALLY ACCEPTABLE IN SANITARY SEWERS; CHECK FEDERAL, STATE AND LOCAL REGULATIONS. CONSULT MANUFACTURER FOR CONTAINER DISPOSAL. RCRA HAZARDOUS WASTE NUMBER: D001, D002.
Handling And Storage Precautions: AVOID CONTACT WITH CLOTHING, ORGANICS OR OTHER COMBUSTIBLE MATERIALS. DO NOT STORE OR TRANSPORT WITH CORROSIVE MATERIALS OR COMBUSTIBLE MATERIALS.
Other Precautions: OXIDIZER. PACKAGING REQUIREMENT: USE SPECIALLY CONSTRUCTED CONTAINERS ONLY. THIS MATERIAL MUST BE HANDLED ONLY BY PERSONS WHO HAVE BEEN SPECIALLY TRAINED IN ITS HAZARDS AND HANDLING PROCEDURES.
==========
Fire and Explosion Hazard Information
==========
Flash Point Text: >200F,>93C
Extinguishing Media: USE WATER PRIOR TO OTHER MEDIA.
Fire Fighting Procedures: USE NIOSH APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire/Explosion Hazard: NONE SPECIFIED BY MANUFACTURER.
==========
Control Measures

==========
Respiratory Protection: USE NIOSH APPROVED SCBA OR EXTERNAL SUPPLIED AIR.
Ventilation: GENERAL AND LOCAL VENTILATION IS REQUIRED.
Protective Gloves: IMPERVIOUS GLOVES (FP N).
Eye Protection: ANSI APPRVD CHEM WORKERS GOGGS (SUPDAT)
Other Protective Equipment: ANSI APPROVED EYE WASH & DELUGE SHOWER (FP N). WEAR SPECIAL RESISTANT FULL BODY COVERING SUIT W/HOOD, GLOVES, BOOTS.
Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.
Supplemental Safety and Health: VP: 5 PSI @ 100F. MATL TO AVOID: REACTS W/BASES & MANY METALS. FIRST AID PROC: EFTS OF BRTHG VAP MAY BE DELAYED FOR HRS/DAYS. KEEP PATIENT AT REST & UNDER SURVEILLANCE A MINIMUM OF 72 HRS. ADMIN OXYGE N IF BRTHG IS DFCLT. DO NOT USE CARBONATED ALKALIES AS ANTIDOTE FOR SWALLOWING. EYE PROT: & FULL LENGTH FSHLD (FP N).
==========
Physical/Chemical Properties
==========
B.P. Text: 140F,60C
M.P/F.P Text: -61F,-52C
Vapor Pres: SUPDAT
Vapor Density: >1
Spec Gravity: 1.57
PH: <2
Solubility in Water: COMPLETE
Appearance and Odor: YELLOW LIQUID; PUNGENT ODOR.
Percent Volatiles by Volume: 100
==========
Reactivity Data
==========
Stability Indicator: YES
Stability Condition To Avoid: TOXIC CORROSIVE FUMES OF NITROGEN DIOXIDE ARE SLOWLY RELEASED AT ROOM TEMPERATURE.
Materials To Avoid: REACTS EXPLOSIVELY W/REDUCING AGENTS & MANY ORGANIC CHEMICALS INCLUDING CYCLOHEXANE, FORMALDEHYDE & ALCOHOLS. (SUPDAT)
Hazardous Decomposition Products: TOXIC CORROSIVE FUMES OF NITROGEN OXIDES AND HYDROGEN FLUORIDE.
Hazardous Polymerization Indicator: NO
Conditions To Avoid Polymerization: NOT RELEVANT
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Toxicological Information
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Ecological Information
==========
==========
MSDS Transport Information
==========
==========
Regulatory Information
==========
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Other Information
==========
==========
HAZCOM Label
==========
Product ID: INHIBITED RED FUMING NITRIC ACID L61
Cage: F0294
Assigned IND: Y
Company Name: DOWELL SCHLUMBERGER
PO Box: 21

City: TULSA OK
Zipcode: 74102
Health Emergency Phone: 918-582-0104
Label Required IND: Y
Date Of Label Review: 11/03/1996
Status Code: C
Label Date: 11/03/1996
Origination Code: G
Eye Protection IND: YES
Skin Protection IND: YES
Signal Word: DANGER
Respiratory Protection IND: YES
Health Hazard: Severe
Contact Hazard: Severe
Fire Hazard: Slight
Reactivity Hazard: Slight
Hazard And Precautions: CORROSIVE. ACUTE: EYES: CORROSIVE. RAPIDLY CAUSES PAIN, BURNS, CORNEAL INJURY. MAY CAUSE PERMANENT DAMAGE AND BLINDNESS. SKIN: TOXIC. CORROSIVE. CAN CAUSE ILLNESS OR DEATH. RAPIDLY CAUSES BURNS, TISSU E DAMAGE AND PAIN. INGESTION: TOXIC. CORROSIVE. CAUSES PAIN AND SEVERE BURNS TO MOUTH, THROAT AND STOMACH. CAN CAUSE ILLNESS OR DEATH. INHALATION: TOXIC. CORROSIVE. VERY DANGEROUS. MAY CAUSE COUGHING, DIFFICULT BREATHING, PULMONARY EDEMA AND DEATH. EFFECTS MAY BE DELAYED HOURS OR DAYS. CHRONIC: NONE LISTED BY MANUFACTURER.

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Disclaimer (provided with this information by the compiling agencies): This information is formulated for use by elements of the Department of Defense. The United States of America in no manner whatsoever expressly or implied warrants, states, or intends said information to have any application, use or viability by or to any person or persons outside the Department of Defense nor any person or persons contracting with any instrumentality of the United States of America and disclaims all liability for such use. Any person utilizing this instruction who is not a military or civilian employee of the United States of America should seek competent professional advice to verify and assume responsibility for the suitability of this information to their particular situation regardless of similarity to a corresponding Department of Defense or other government situation.

DOWELL SCHLUMBERGER -- INHIBITED RED FUMING NITRIC ACID L51, L061

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MSDS Safety Information

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FSC: 6810
MSDS Date: 09/25/1991
MSDS Num: CGSQN
LIIN: 00N084291
Product ID: INHIBITED RED FUMING NITRIC ACID L51, L061
MFN: 01
Responsible Party
Cage: F0294
Name: DOWELL SCHLUMBERGER
Box: 2710
City: TULSA OK 74101
Info Phone Number: 918-582-0104
Emergency Phone Number: 918-582-0104
Preparer's Name: W W SHEPHERD
Published: Y

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Contractor Summary

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Cage: 66662
Name: CASTOLEUM CORP THE
Address: 240 E 7TH ST
City: MOUNT VERNON NY 10550-4615
Phone: 914-664-5877
Cage: F0294
Name: DOWELL SCHLUMBERGER
Box: 21
City: TULSA OK 74102
Phone: (918) 582-0104

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Ingredients

==========

Cas: 7697-37-2
RTECS #: QU5775000
Name: NITRIC ACID (SARA 302/313) (CERCLA)
OSHA PEL: 2 PPM
ACGIH TLV: 2 PPM/4 STEL
EPA Rpt Qty: 1000 LBS
DOT Rpt Qty: 1000 LBS

Cas: 10544-72-6
RTECS #: QX1575000
Name: NITROGEN TETROXIDE; ((NITROGEN DIOXIDE), DI) (CERCLA)
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)
EPA Rpt Qty: 10 LBS
DOT Rpt Qty: 10 LBS

Cas: 7664-39-3
RTECS #: MW7875000
Name: HYDROFLUORIC ACID; (HYDROGEN FLUORIDE) (HF) LESS THAN 1 PERCENT) (SARA 302/313) (CERCLA)
% Wt: <1
OSHA PEL: 3 PPM (F)
ACGIH TLV: C 3 PPM(F)
EPA Rpt Qty: 100 LBS
DOT Rpt Qty: 100 LBS

Cas: 7732-18-5
RTECS #: ZC0110000
Name: WATER
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Name: SUPDAT: 372: HYDROGEN FLUORIDE (<1%; NITRIC ACID (83%).

Name: EYE PROT: & FULL LENGTH FACESHIELD (FP N).
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Health Hazards Data
==========
LD50 LC50 Mixture: LD50:(RAT)=67PPM/4 HRS(NITROGEN DIOXIDE)
Route Of Entry Inds - Inhalation: YES
Skin: YES
Ingestion: YES
Carcinogenicity Inds - NTP: NO
IARC: NO
OSHA: NO
Effects of Exposure: ACUTE: EYE: CORROSIVE. RAPIDLY CAUSES PAIN, BURNS, CORNEAL INJURY. MAY CAUSE PERMANENT DAMAGE AND BLINDNESS. SKIN: TOXIC. CORROSIVE. CAN CAUSE ILLNESS OR DEATH. RAPIDLY CAUSES BURNS, TISSUE DAMAGE AND PAIN. INGESTION: TOXIC. CORROSIVE. CAUSES PAIN AND SEVERE BURNS TO MOUTH, THROAT, AND STOMACH. CAN (EFTS OF OVEREXP)
Explanation Of Carcinogenicity: NOT RELEVANT.
Signs And Symptions Of Overexposure: HLTH HAZ: CAUSE ILLNESS OR DEATH. INHALATION: TOXIC. CORROSIVE. VERY DANGEROUS. POOR WARNING PROPERTIES. MAY CAUSE COUGHING, DIFFICULT BRTHG, PULM EDEMA & DEATH. EFTS MAY NOT APPEAR FOR SEVERAL HRS OR FEW DAYS AFTER EXPOS. OTHER: 50 PPM ASVAP IS IRRIT TO EYES & NOSE. ODOR IS PERCEPTIBLE FOR MOST PERSONS @ 0.22 PPM.
Medical Cond Aggravated By Exposure: NONE SPECIFIED BY MANUFACTURER.
First Aid: EYE CONT: IMMED FLUSH W/WATER FOR @ LST 15 MINS WHILE HOLDING EYELIDS OPEN. SEE MD AT ONCE. SKIN CONT: IMMED WASH W/SOAP & WATER FOR 30 MINS. SEE MD AT ONCE. DESTROY CONTAMD SHOES & CLTHG. INGEST: DO NOT INDUCE VOMIT. DRINK LG QTYS OF MILK(PREFERRED) OR WATER & GIVE MILK OF MAGNESIA. TAKE TO HOSPITAL AT ONCE. INHAL: REMOVE TO FRESH AIR. SEE MD AT ONCE. IF BRTHG HAS STOPPED, BEGIN ARTF (SUPDAT)
==========
Handling and Disposal
==========
Spill Release Procedures: CONTAIN WITH DIKES. DILUTE WITH WATER. NEUTRALIZE WITH SODA ASH OR LIME. PUT IN STEEL DRUM (PLASTIC DRUM IF ACIDIC).
Neutralizing Agent: SODA ASH OR LIME.
Waste Disposal Methods: NEUTRALIZED MATL IS GENERALLY ACCEPTABLE IN SANITARY SEWERS; CHECK FEDERAL, STATE AND LOCAL REGS. FISH TOX: TOXIC TO FISH. DO NOT ALLOW TO ENTER WATERWAY. CERCLA REPORTABLE QTY: 5.7 GALLONS (NITROGEN DIOXIDE). RCRA HAZ WASTE NUMBER: D001, D002.
Handling And Storage Precautions: AVOID CONT W/CLOTHING, ORGANICS/OTHER COMBUST MATLS. DO NOT STORE OR TRANSPORT W/CORROSIVE MATLS/COMBUSTIBLE MATERIALS.
Other Precautions: THIS MATL MUST BE HNDLD ONLY BY PERSONS WHO HAVE BEEN SPECIALLY TRAINED IN ITS HAZARDS & HNDLG PROCEDURES. THIS PROD CNTNS FOLLOWING TOXIC CHEMS SUBJECT TO RPTG REQUIREMENTS OF SECTION 313 OF TITLE II I OF SUPERFUND AMENDMENTS & (SUPDAT)
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Fire and Explosion Hazard Information
==========
Flash Point Text: >200F,>93C
Extinguishing Media: USE WATER PRIOR TO OTHER MEDIA.
Fire Fighting Procedures: USE NIOSH APPROVED SCBA & FULL PROTECTIVE

EQUIPMENT (FP N).
Unusual Fire/Explosion Hazard: NONE SPECIFIED BY MANUFACTURER.

Control Measures

Respiratory Protection: USE NIOSH APPROVED SCBA OR EXTERNAL SUPPLIED AIR.
Ventilation: GENERAL AND LOCAL VENTILATION IS REQUIRED.
Protective Gloves: IMPERVIOUS GLOVES (FP N).
Eye Protection: ANSI APPRVD CHEM WORKERS GOGGS
Other Protective Equipment: ANSI APPRVD EYE WASH & DELUGE SHOWER (FP N). WEAR SPEC RESISTANT FULL BODY COVERING SUIT WITH HOOD, GLOVES, & BOOTS.
Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.
Supplemental Safety and Health: MATLS TO AVOID: AND MANY METALS. FIRST AID PROC: RESP. NOTEST: EFTS OF BRTHG VAP MAY BE DELAYED FOR HRS/DAYS. KEEP PATIENT @ REST & UNDER SURVEILLANCE A MIN OF 72 HRS. ADMIN OXYG IF BRTHG IS DFCLT. DO NOT USE CARBONATED ALKALIES AS ANTIDOTE FOR SWALLOWING. OTHER PREC: REAUTHORIZATION ACT OF 1986 & 40 CFR PART

Physical/Chemical Properties

B.P. Text: 140F,60C
M.P/F.P Text: -61F,-52C
Vapor Pres: 5 PSI
Vapor Density: >1
Spec Gravity: 1.57
PH: <2
Evaporation Rate & Reference: NOT KNOWN
Solubility in Water: COMPLETE
Appearance and Odor: YELLOW LIQUID, PUNGENT ODOR.
Percent Volatiles by Volume: 100

Reactivity Data

Stability Indicator: YES
Stability Condition To Avoid: TOXIC CORROSIVE FUMES OF NITROGEN DIOXIDE ARE SLOWLY RELEASED AT ROOM TEMPERATURE.
Materials To Avoid: REACTS EXPLOSIVELY W/REDUCING AGENTS & MANY ORG CHEMS INCL CYCLOHEXANE, FORMALDEHYDE, & ALCOHOLS. REACTS W/BASES(SUPDAT)
Hazardous Decomposition Products: TOXIC CORROSIVE FUMES OF NITROGEN OXIDES AND HYDROGEN FLUORIDE.
Hazardous Polymerization Indicator: NO
Conditions To Avoid Polymerization: NOT RELEVANT.

Toxicological Information

Ecological Information

MSDS Transport Information

Regulatory Information

Other Information

HAZCOM Label

Product ID: INHIBITED RED FUMING NITRIC ACID L51, L061
Cage: F0294
Assigned IND: Y
Company Name: DOWELL SCHLUMBERGER
PO Box: 21
City: TULSA OK
Zipcode: 74102
Health Emergency Phone: 918-582-0104
Label Required IND: Y
Date Of Label Review: 03/24/1998
Status Code: C
Label Date: 03/24/1998
Origination Code: G
Eye Protection IND: YES
Skin Protection IND: YES
Signal Word: DANGER
Respiratory Protection IND: YES
Health Hazard: Severe
Contact Hazard: Severe
Fire Hazard: Slight
Reactivity Hazard: None
Hazard And Precautions: ACUTE: EYE: CORROSIVE. RAPIDLY CAUSES PAIN, BURNS, CORNEAL INJURY. MAY CAUSE PERMANENT DAMAGE AND BLINDNESS. SKIN: TOXIC. CORROSIVE. CAN CAUSE ILLNESS OR DEATH. RAPIDLY CAUSES BURNS, TISSUE DAMAGE AND PAIN. INGESTION: TOXIC. CORROSIVE. CAUSES PAIN AND SEVERE BURNS TO MOUTH, THROAT, AND STOMACHE. CAN CAUSE ILLNESS OR DEATH. INHALATION: TOXIC. CORROSIVE. VERY DANGEROUS. MAY CAUSE COUGHING, DIFFICULT Y BREATHING, PULMONARY EDEMA AND DEATH. CHRONIC: NONE LISTED BY MANUFACTURER.

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Disclaimer (provided with this information by the compiling agencies): This information is formulated for use by elements of the Department of Defense. The United States of America in no manner whatsoever expressly or implied warrants, states, or intends said information to have any application, use or viability by or to any person or persons outside the Department of Defense nor any person or persons contracting with any instrumentality of the United States of America and disclaims all liability for such use. Any person utilizing this instruction who is not a military or civilian employee of the United States of America should seek competent professional advice to verify and assume responsibility for the suitability of this information to their particular situation regardless of similarity to a corresponding Department of Defense or other government situation.

AMERADA HESS CORPORATION

NFPA 704 (Section 16)

MATERIAL SAFETY DATA SHEET

JP -4 **MSDS No. 9947**

1. CHEMICAL PRODUCT and COMPANY INFORMATION (rev. Jan-99)

Amerada Hess Corporation
1 Hess Plaza
Woodbridge, NJ 07095-0961

EMERGENCY TELEPHONE NUMBER (24 hrs): CHEMTREC (800)424-9300
COMPANY CONTACT (business hours): Corporate Safety (732)750-6000

SYNONYMS: JP - 4 Jet Fuel
See Section 16 for abbreviations and acronyms.

2. COMPOSITION and INFORMATION ON INGREDIENTS (rev. Jan-99)

INGREDIENT NAME	EXPOSURE LIMITS	CONCENTRATION PERCENT BY WEIGHT
Kerosene CAS NUMBER: 8008-20-6	OSHA PEL-TWA: 5 mg/m^3 as mineral oil mist ACGIH TLV-TWA: 1997 NOIC - 100 mg/m^3, skin, A3	35 to 65
Light Naphtha CAS NUMBER: 64742-73-0	OSHA PEL-TWA: 5 mg/m^3 as mineral oil mist ACGIH TLV-TWA: 1997 NOIC - 100 mg/m^3, skin, A3	<balance>
Benzene CAS NUMBER: 71-43-2	OSHA PEL-TWA/STEL: 1 / 5 ppm ACGIH TLV-TWA/STEL: 0.5 / 2.5 ppm, A1, skin US Coast Guard: same as OSHA	0.1 to 0.4

A complex combination of hydrocarbons including naphthenes, paraffins, and aromatics.

3. HAZARDS IDENTIFICATION (rev. Jan-99; Tox-99)

EMERGENCY OVERVIEW
DANGER!
EXTREMELY FLAMMABLE - EYE AND MUCOUS MEMBRANE IRRITANT - EFFECTS CENTRAL NERVOUS SYSTEM - HARMFUL OR FATAL IF SWALLOWED - ASPIRATION HAZARD

High fire hazard. Keep away from heat, spark, open flame, and other ignition sources.

If ingested, do NOT induce vomiting, as this may cause chemical pneumonia (fluid in the lungs). Contact may cause eye, skin and mucous membrane irritation. Harmful if absorbed through the skin. Avoid prolonged breathing of vapors or mists. Inhalation may cause irritation, anesthetic effects (dizziness, nausea, headache, intoxication), and respiratory system effects.

Long-term exposure may cause effects to specific organs, such as to the liver, kidneys, blood, nervous system, and skin. Contains benzene, which can cause blood disease, including anemia and leukemia.

EYES
Contact may cause mild irritation.

SKIN
Practically non-toxic if absorbed following acute (single) exposure. May cause skin irritation with prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are exposed repeatedly.

INGESTION
The major health threat of ingestion occurs from the danger of aspiration (breathing) of liquid drops into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure and even death.

Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous system (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest, and death may occur.

INHALATION
Excessive exposure may cause irritation to the nose, throat, lungs and respiratory tract. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death.

WARNING: the burning of any hydrocarbon as a fuel in an area without adequate ventilation may result in hazardous levels of combustion products, including carbon monoxide, and inadequate oxygen levels, which may cause unconsciousness, suffocation, and death.

CHRONIC EFFECTS and CARCINOGENICITY
Similar products produced skin cancer and systemic toxicity in laboratory animals following repeated applications. The significance of these results to human exposures has not been determined - see Section 11 Toxicological Information.

Contains benzene, a regulated human carcinogen. Benzene has the potential to cause anemia and other blood diseases, including leukemia, after repeated and prolonged exposure.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE
Irritation from skin exposure may aggravate existing open wounds, skin disorders, and dermatitis (rash).

4. FIRST AID MEASURES (rev. Jan-99; Tox-99)

EYES
In case of contact with eyes, immediately flush with clean, low-pressure water for at least 15 min. Hold eyelids open to ensure adequate flushing. Seek medical attention.

SKIN
Remove contaminated clothing. Wash contaminated areas thoroughly with soap and water or waterless hand cleanser. Obtain medical attention if irritation or redness develops.

INGESTION
DO NOT INDUCE VOMITING. Do not give liquids. Obtain immediate medical attention. If spontaneous vomiting occurs, lean victim forward to reduce the risk of aspiration. Monitor for breathing difficulties. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

INHALATION
Remove person to fresh air. If person is not breathing, ensure an open airway and provide artificial respiration If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

5. FIRE FIGHTING MEASURES (rev. Jan-94)

FLAMMABLE PROPERTIES:

FLASH POINT:	-10 to 30 °F (-23 to -1 °C)
AUTOIGNITION POINT:	464 °F (240 °C)
OSHA/NFPA FLAMMABILITY CLASS:	1B Flammable
LOWER EXPLOSIVE LIMIT (%):	1.3
UPPER EXPLOSIVE LIMIT (%):	8.0

FIRE AND EXPLOSION HAZARDS
Vapors may be ignited rapidly when exposed to heat, spark, open flame or other source of ignition. When mixed with air and exposed to an ignition source, flammable vapors can burn in the open or explode in confined spaces. Being heavier than air, vapors may travel long distances to an ignition source and flash back. Runoff to sewer may cause fire or explosion hazard.

EXTINGUISHING MEDIA
SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO_2, water spray, fire fighting foam, or Halon.

LARGE FIRES: Water spray, fog or fire fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

FIRE FIGHTING INSTRUCTIONS
Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other fire fighting equipment.

Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing.

Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

See Section 16 for the NFPA 704 Hazard Rating.

6. ACCIDENTAL RELEASE MEASURES (rev. Jan-99)

ACTIVATE FACILITY'S SPILL CONTINGENCY OR EMERGENCY RESPONSE PLAN.

Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to confirm spill areas. Spills may infiltrate subsurface soil and groundwater; professional assistance may be necessary to determine the extent of subsurface impact.

Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. The proper use of water spray may effectively disperse product vapors or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection.

Take up with sand or other oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal - caution, flammable vapors may accumulate in closed containers. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

7. HANDLING and STORAGE (rev. Jan-99)

HANDLING PRECAUTIONS
Handle as a combustible liquid. Keep away from heat, sparks, and open flame! Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil) is loaded into tanks previously containing low flash point products (such as this product) - see API Publication 2003, "Protection Against Ignitions Arising Out Of Static, Lightning and Stray Currents.

STORAGE PRECAUTIONS
Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition.

Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

WORK/HYGIENIC PRACTICES
Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this product from exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

8. EXPOSURE CONTROLS and PERSONAL PROTECTION (rev. Jan-99)

ENGINEERING CONTROLS
Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

EYE/FACE PROTECTION
Safety glasses or goggles are recommended where there is a possibility of splashing or spraying.

SKIN PROTECTION
Gloves constructed of nitrile, neoprene, or PVC are recommended. Chemical protective clothing such as of E.I. DuPont Tychem®, Saranex® or equivalent recommended based on degree of exposure. Note: The resistance of specific material may vary from product to product as well as with degree of exposure. Consult manufacturer specifications for further information.

RESPIRATORY PROTECTION
A NIOSH/MSHA-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection.

Use a positive pressure, air-supplied respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

9. PHYSICAL and CHEMICAL PROPERTIES (rev. Jan-99)

APPEARANCE
Pale yellow to water-white liquid

ODOR
Characteristic petroleum distillate odor

BASIC PHYSICAL PROPERTIES

BOILING RANGE:	135 to 518 °F (57 to 270 °C)
VAPOR PRESSURE:	2-3 psia @ 100 °F (38 °C)
VAPOR DENSITY (air = 1):	AP 4.5
SPECIFIC GRAVITY (H_2O = 1):	0.75 - 0.80
PERCENT VOLATILES:	100 %
EVAPORATION RATE:	Fast, based on naphtha component
SOLUBILITY (H_2O):	Negligible

10. STABILITY and REACTIVITY (rev. Jan-94)

STABILITY: Stable. Hazardous polymerization will not occur.

CONDITIONS TO AVOID and INCOMPATIBLE MATERIALS
Material is stable under normal conditions. Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources. Keep away from strong oxidizers such as nitric and sulfuric acids.

HAZARDOUS DECOMPOSITION PRODUCTS
Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

11. TOXICOLOGICAL PROPERTIES (rev. Jan-99; Tox-99)

ACUTE TOXICITY
Acute dermal LD50 (rabbits): > 5 g/kg
Acute oral LD50 (rats): > 25 g/kg
Primary dermal irritation: mildly irritating (rabbits)
Primary eye irritation: mildly irritating (rabbits)
Guinea pig sensitization: negative

CHRONIC EFFECTS AND CARCINOGENICITY
Carcinogenicity: **OSHA**: NO **IARC**: NO **NTP**: NO **ACGIH**: 1997 NOIC: A3
Dermal carcinogenicity: positive (mice)

Studies have shown that similar products produce skin cancer or skin tumors in laboratory animals following repeated applications without washing or removal. The significance of this finding to human exposure has not been determined. Other studies with active skin carcinogens have shown that washing the animal's skin with soap and water between applications reduced tumor formation.

This product contains benzene. Human health studies indicate that prolonged and/or repeated overexposure to benzene may cause damage to the blood-forming system (particularly bone marrow), and serious blood disorders such as aplastic anemia and leukemia. Benzene is listed as a human carcinogen by the NTP, IARC, OSHA and ACGIH.

12. ECOLOGICAL INFORMATION (rev. Jan-99)

Keep out of sewers, drainage areas and waterways. Report spills and releases, as applicable, under Federal and State regulations.

13. DISPOSAL CONSIDERATIONS (rev. Jan-99)

Consult federal, state and local waste regulations to determine appropriate disposal options.

14. TRANSPORTATION INFORMATION (rev. Jan-99)

PROPER SHIPPING NAME:	Fuel, Aviation, turbine engine
HAZARD CLASS and PACKING GROUP:	3, PG II
DOT IDENTIFICATION NUMBER:	UN 1863
DOT SHIPPING LABEL:	FLAMMABLE LIQUID

15. REGULATORY INFORMATION (rev. Jan-99)

U.S. FEDERAL, STATE, and LOCAL REGULATORY INFORMATION
This product and its constituents listed herein are on the EPA TSCA Inventory. Any spill or uncontrolled release of this product, including any substantial threat of release, may be subject to federal, state and/or local reporting requirements. This product and/or its constituents may also be subject to other regulations at the state and/or local level. Consult those regulations applicable to your facility/operation.

CLEAN WATER ACT (OIL SPILLS)
Any spill or release of this product to "navigable waters" (essentially any surface water, including certain wetlands) or adjoining shorelines sufficient to cause a visible sheen or deposit of a sludge or emulsion must be reported immediately to the National Response Center (1-800-424-8802) or, if not practical, the U.S. Coast Guard with follow-up to the National Response Center, as required by U.S. Federal Law. Also contact appropriate state and local regulatory agencies as required.

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIRONMENT)
The CERCLA definition of hazardous substances contains a "petroleum exclusion" clause which exempts crude oil, refined, and unrefined petroleum products and any indigenous components of such. However, other federal reporting requirements (e.g., SARA Section 304 as well as the Clean Water Act if the spill occurs on navigable waters) may still apply.

SARA SECTION 311/312 - HAZARD CLASSES

ACUTE HEALTH	CHRONIC HEALTH	FIRE	SUDDEN RELEASE OF PRESSURE	REACTIVE
X	X	X	--	--

SARA SECTION 313 - SUPPLIER NOTIFICATION

This product contains the following toxic chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372:

INGREDIENT NAME (CAS NUMBER)	CONCENTRATION PERCENT BY WEIGHT
Benzene (71-43-2)	0.01 to 0.4

CANADIAN REGULATORY INFORMATION (WHMIS)

Class B, Division 2 (Flammable Liquid)
Class D, Division 2A (Very toxic by other means) and Class D, Division 2B (Toxic by other means)

16. OTHER INFORMATION (rev. Jan-99)

NFPA® HAZARD RATING	HEALTH:	1	Slight
	FIRE:	3	High
	REACTIVITY:	0	Negligible
HMIS® HAZARD RATING	HEALTH:	1 *	Slight
	FIRE:	3	High
	REACTIVITY:	0	Negligible
			* CHRONIC

SUPERSEDES MSDS DATED: 08/22/94

ABBREVIATIONS:

AP = Approximately < = Less than > = Greater than
N/A = Not Applicable N/D = Not Determined ppm = parts per million

ACRONYMS:

ACGIH	American Conference of Governmental Industrial Hygienists
AIHA	American Industrial Hygiene Association
ANSI	American National Standards Institute (212)642-4900
API	American Petroleum Institute (202)682-8000
CERCLA	Comprehensive Emergency Response, Compensation, and Liability Act
DOT	U.S. Department of Transportation [General Info: (800)467-4922]
EPA	U.S. Environmental Protection Agency
HMIS	Hazardous Materials Information System
IARC	International Agency For Research On Cancer
MSHA	Mine Safety and Health Administration
NFPA	National Fire Protection Association (617)770-3000
NIOSH	National Institute of Occupational Safety and Health
NOIC	Notice of Intended Change (proposed change to ACGIH TLV)
NTP	National Toxicology Program
OPA	Oil Pollution Act of 1990
OSHA	U.S. Occupational Safety & Health Administration
PEL	Permissible Exposure Limit (OSHA)
RCRA	Resource Conservation and Recovery Act
REL	Recommended Exposure Limit (NIOSH)
SARA	Superfund Amendments and Reauthorization Act of 1986 Title III
SCBA	Self-Contained Breathing Apparatus
SPCC	Spill Prevention, Control, and Countermeasures
STEL	Short-Term Exposure Limit (generally 15 minutes)
TLV	Threshold Limit Value (ACGIH)
TSCA	Toxic Substances Control Act
TWA	Time Weighted Average (8 hr.)
WEEL	Workplace Environmental Exposure Level (AIHA)
WHMIS	Workplace Hazardous Materials Information System (Canada)

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Information presented herein has been compiled from sources considered to be dependable, and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgment.

Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material, even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in their use of the material.

EXXON CHEMICAL COMPANY, DIVISI -- METHYL ETHYL KETONE

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MSDS Safety Information

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FSC: 6810
NIIN: 00-281-2762
MSDS Date: 05/08/1999
MSDS Num: CKWJZ
Product ID: METHYL ETHYL KETONE
MFN: 02
Responsible Party
Cage: TO317
Name: EXXON CHEMICAL COMPANY, DIVISION EXXON CORP
Box: 3272
City: HOUSTON TX 77253-3272
Info Phone Number: 281-870-6000\281-870-6884
Emergency Phone Number: 800-726-2015
Resp. Party Other MSDS No.: 92050000

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Item Description Information

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Item Manager: S9G
Item Name: METHYL ETHYL KETONE,TECHNICAL
Specification Number: NONE
Unit of Issue: CN
Quantitative Expression: 00000000005GL
UI Container Qty: 1
Type of Container: CAN

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Ingredients

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Name: THIS PRODUCT IS HAZARDOUS AS DEFINED IN 29 CFR1910.1200. OSHA HAZARD: FLAMMABLE. PEL: TLV. EYE IRRITANT.

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Health Hazards Data

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Carcinogenicity Inds - NTP: NO
IARC: NO
OSHA: NO
Effects of Exposure: POTENTIAL HEALTH EFFECTS: EYE CONTACT: SEVERELY IRRITATING. IF NOT REMOVED PROMPTLY, WILL INJURE EYE TISSUE, WHICH MAY RESULT IN PERMANENT DAMAGE. SKIN CONTACT: FREQUENT/PROLONGED CONTACT MAY IRRITATE AND CAUSE DERMATITIS. LOW ORDER OF TOXICITY. INHALATION: VAPOR CONCENTRATIONS ABOVE EXPOSURE LEVELS ARE IRRITATING TO EYES AND RESPIRATORY TRACT, MAY CAUSE HEADACHES AND DIZZINESS, ARE ANESTHETIC AND MAY HAVE OTHER CENTRAL NERVOUS SYSTEM EFFECTS. INGESTION: SMALL AMOUNTS OF THE LIQUID ASPIRATED INTO THE RESPIRATORY SYSTEM DURING INGESTION, OR FROM VOMITING, MAY CAUSE PULMONARY EDEMA. CHRONIC EFFE CTS: NO NEUROTOXIC EFFECTS.
Signs And Symptions Of Overexposure: INHALATION: MAY CAUSE HEADACHES AND DIZZINESS, ARE ANESTHETIC.
First Aid: EYE CONTACT: IMMEDIATELY FLUSH EYES WITH LARGE AMOUNT OF WATER FOR AT LEAST 15 MINUTES. GET PROMPT MEDICAL ATTENTION. SKIN CONTACT: IMMEDIATELY FLUSH WITH LARGE AMOUNT OF WATER; USE SOAP IF AVAILABLE . REMOVE CONTAMINATED CLOTHING, INCLUDING SHOES, AFTER FLUSHING HAS BEGUN. INHALATION: USING PROPER RESPIRATORY PROTECTION, IMMEDIATELY REMOVE THE AFFECTED VICTIM FROM EXPOSURE. ADMINISTER ARTIFICIAL RESPIRATION IF BREATHING IS STOPPED. KEEP AT REST. CALL FOR PROMPT MEDICAL ATTENTION. INGESTION: IF SWALLOWED, DO NOT INDUCE VOMITING. KEEP AT REST. GET PROMPT MEDICAL ATTENTION.

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Handling and Disposal

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Spill Release Procedures: WATER SPILL-ELIMINATE SOURCES OF IGNITION. WARN OCCUPANTS & SHIPPING IN SURROUNDING & DOWNWIND AREAS OF FIRE & EXPLOSION HAZARD & REQUEST ALL TO STAY CLEAR. CONSULT AN EXPERT ON DISPOSAL OF RECOVERED MATERIAL & ENSURE CONFORMITY TO LOCAL DISPOSAL REGULATIONS. ***(SEE OTHER INFORMATION FOR LAND SPILL DATA).

Waste Disposal Methods: CONSULT AN EXPERT ON DISPOSAL OF RECOVERED MATERIAL AND ENSURE CONFORMITY TO LOCAL DISPOSAL REGUALTIONS. ELECTROSTATIC ACCUMULATION HAZARD: NO, BUT USE PROPER BONDING &/OR GROUND PROCEDURES. LOADING/ UNLOADING TEMP, F: AMBIENT. STORAGE/TRANSPORT PRESSURE, MMHG: ATMOSPHERIC. LOADING/UNLOADING VISCOSI TY, CST: 0.5.

Handling And Storage Precautions: KEEP CONTAINER CLOSED. HANDLE AND OPEN CONTAINERS WITH CARE. STORE IN A COOL, WELL VENTILATED PLACE AWAY FROM INCOMPATIBLE MATERIALS. DO NOT HANDLE OR STORE NEAR AN OPEN FLAME, HEAT OR OTHER SOURCES O F IGNITION. PROTECT MATERIAL FROM DIRECT SUNLIGHT. STORAGE TEMPERATURE, F: AMBIENT.

Other Precautions: THIS MATERIAL IS NOT A STATIC ACCUMULATOR, BUT USE PROPER BONDING AND/OR GROUNDING PROCEUDRES. DO NOT PRESSURIZE, CUT, HEAT, OR WELD CONTAINERS. EMPTY PRODUCT CONTAINERS MAY RETAIN PRODUCT RESIDUE. DO NOT REUSE EMPTY CONTAINERS WITHOUT COMMERCIAL CLEANING OR RECONDITIONING.

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Fire and Explosion Hazard Information

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Flash Point: =-3.7C, 25.F

Autoignition Temp: =460.C, 860.F

Lower Limits: 1.8

Upper Limits: 11.5

Extinguishing Media: EITHER ALLOW FIRE TO BURN OUT UNDER CONTROLLED CONDITIONS OR EXTINGUISH WITH ALCOHOL TYPE FOAM, OR DRY CHEMICAL. TRY TO COVER LIQUID SPILLS WITH FOAM.

Fire Fighting Procedures: USE WATER SPRAY TO COOL FIRE EXPOSED SURFACES AND TO PROTECT PERSONNEL. SHUT OFF "FUEL" TO FIRE. IF A LEAK OR SPILL HAS NOT IGNITED, USE WATER SPRAY TO DISPERSE THE VAPORS. AVOID SPRAYING WATER DIRECT LY INTO STORAGE CONTAINERS DUE TO DANGER OF BOILOVER.

Unusual Fire/Explosion Hazard: FLAMMABLE LIQUID, CAN RELEASE VAPORS THAT FORM FLAMMABLE MIXTURES AT TEMPERATURES AT OR ABOVE THE FLASHPOINT.

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Control Measures

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Respiratory Protection: WHERE CONCENTRATIONS IN AIR MAY EXCEED THE LIMITS GIVEN AND ENGINEERING, WORK PRACTICE OR OTHER MEANS OF EXPOSURE REDUCTION ARE NOT ADAQUATE, NIOSH/MSHA APPROVED RESPIRATORS MAY BE NECESSARY TO PREVEN T OVEREXPOSURE BY INHALATION.

Ventilation: THE USE OF MECHANICAL DILUTION VENTILATION IS RECOMMENDED WHENEVER IT IS USED IN CONFINED SPACES, HEATED/AGITATED. USE EXPLOSION-PROOF VENTILATION EQUIPMENT.

Protective Gloves: CHEMICAL RESISTANT GLOVES.

Eye Protection: WEAR CONTACT MAY OCCUR, WEAR A FACE SHIELD.

Other Protective Equipment: FOR OPEN SYSTEMS WHERE CONTACT IS LIKELY, WEAR LONG SLEEVES, CHEMICAL RESISTANT GLOVES, & CHEMICAL GOGGLES.

Work Hygienic Practices: NOT PROVIDED

Supplemental Safety and Health: "EMPTY" CONTAINERS RETAIN PRODUCT RESIDUE (LIQUID AND/OR VAPOR) AND CAN BE DANGEROUS. DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS OR OTHE R IGNITION SOURCES: THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

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Physical/Chemical Properties

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HCC: F2

NRC/State LIC No: NOT RELEVANT

B.P. Text: 175-177F
Melt/Freeze Pt: <0.C, 32.F
Decomp Text: NOT PROVIDED
Vapor Pres: 82.51 @ 75F
Vapor Density: >1
Spec Gravity: 0.81
PH: NOT RELEVANT
Viscosity: 0.5 CST @ 68F
Evaporation Rate & Reference: 6.0 (N-BUTYL ACETATE=1)
Solubility in Water: 26.3% @ 68F
Appearance and Odor: CLEAR COLORLESS LIQUID.
Percent Volatiles by Volume: 100
Corrosion Rate: NOT PROVIDED

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Reactivity Data

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Stability Indicator: YES
Materials To Avoid: CAUSTICS, AMINES, ALKANOLAMINES, ALDEHYDES, AMMONIA, STRONG OXIDIZING AGENTS, AND CHLORINATED COMPOUNDS.
Hazardous Decomposition Products: NONE.
Hazardous Polymerization Indicator: NO

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Toxicological Information

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Toxicological Information: CHRONIC EFFECTS:THERE IS NO EVIDENCE THAT EXPOSURE TO METHYL ETHYL KETONE (MEK) ALONE CAUSES PROGRESSIVE OR IRREVERSIBLE NEOROTOXIC EFFECTS. HOWEVER, SIMULTANEOUS OVER-EXPOSURE TO MEK & N-HEXANE. THER E IS NO REPORTED HUMAN EVIDENCE THAT THESE NEUROTOXIC EFFECTS OCCUR WHEN EXPOSURE TO BOTH CHEMICALS IS MAINTAINED BELOW ESTABLISHED OSHA & ACGIH LIMITS. WORKPLACE EXPOSURE GUIDELINES; OSHA REGULATION 29CFR1910.1000 REQUIRES THE FOLLOWING PERMISSIBLE EXPOSURE LIMITS: A TWA OF 200 PPM (590 MG/M3) & A STEL OF 300 PPM (885 MG/M3) FOR METHYL ETHYL KETONE (2-BUTANONE).

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Ecological Information

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Ecological: NO SPECIFIC ECOLOGICAL DATA ARE AVAILABLE FOR THIS PRODUCT. PLEASE REFER TO SPILL RELEASE SECTION FOR INFORMATION REGARDING ACCIDENTAL RELEASE AND REGULATORY SECTIONS FOR REGULATORY REPORTING INFORMAT ION.

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MSDS Transport Information

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Transport Information: DEPARTMENT OF TRASNPORTATION (DOT): DOT SHIPPING DESCRIPTION: METHYL ETHYL KETONE, 3, UN 1193, I I.

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Regulatory Information

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Sara Title III Information: UNDER THE PROVISIONS OF TITLE III, SECTIONS 311/312 OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT, THIS PRODUCT IS CLASSIFIED INTO THE FOLLOWING HAZARD CATEGORIES: IMMEDIATE HEALTH, DELAYED HEAL TH, FIRE. THIS INFORMATION MAY BE SUBJECT TO THE PROVISIONS OF THE COMMUNITY RIGHT-TO-KNOW REPORTING REQUIREMENTS (40 CFR 370) IF THRESHOLD QUANTITY CRITERIA ARE MET. THIS PRODUCT CONTAINS THE FOLLOWI NG SECTION 313 REPORTABLE INGREDIENTS: METHYL ETHYL KETONE 78-93-3, 100.0% MAXIMUM.
Federal Regulatory Information: THIS PRODUCT IS LISTED ON THE TSCA INVENTORY AT CAS REGISTRY NUMBER 78-93-3.
CERCLA: IF THE REPORTABLE QUANTITY OF THIS PRODUCT IS ACCIDENTALLY SPILLED, THE INCIDENT IS SUBJECT TO THE PROVISIONS OF TH E COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITY ACT (CERCLA) AND MUST BE REPORTED TO THE NATIONAL RESPONSE CENTER BY CALLING 800-424-8802. THE REPORTABLE QUANTITY OF

THIS PRODUCT IS 5,000 POUNDS. THIS PRODUCT CONTAINS: METHYL ETHYL KETONE.
State Regulatory Information: NOT PROVIDED

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Other Information

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Other Information: LAND SPILL-ELIMINATE IGNITION SOURCES. PREVENT ADDITIONAL DISCHARGES OF MATERIAL, IF POSSIBLE TO DO SO WITHOUT HAZARD. FOR SMALL SPILLS IMPLEMENT CLEANUP PROCEDURES; FOR LARGE SPILLS IMPLEMENT CLEANUP PROCEDURES &, IF IN PUBLIC AREA, KEEP PUBLIC AWAY & ADVISE AUTHORITIES. IF PRODUCT IS SUBJECT TO CERCLA REPORTING (SEE REGULATORY INFORMATION) NOTIFY THE NATIONAL RESPONSE CENTER. PREVENT LIQUID FR OM ENTERING SEWERS, WATERCOURSES, LOW AREAS. CONTAIN WITH SAND OR EARTH. DO NOT USE COMBUSTIBLE MATERIAL SUCH AS SAWDUST. RECOVER BY PUMPING (EXPLOSION PROOF/HAND PUMP) OR WITH SUITABLE ABSORBENT.

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Transportation Information

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Responsible Party Cage: TO317
Trans ID NO: 155482
Product ID: METHYL ETHYL KETONE
MSDS Prepared Date: 05/08/1999
Review Date: 12/04/2000
MFN: 2
Net Unit Weight: 33.7 LBS
Multiple KIT Number: 0
Review IND: Y
Unit Of Issue: CN
Container QTY: 1
Type Of Container: CAN

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Detail DOT Information

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DOT PSN Code: FWQ
DOT Proper Shipping Name: ETHYL METHYL KETONE OR METHYL ETHYL KETONE
Hazard Class: 3
UN ID Num: UN1193
DOT Packaging Group: II
Label: FLAMMABLE LIQUID
Special Provision: T8
Packaging Exception: 150
Non Bulk Pack: 202
Bulk Pack: 242
Max Qty Pass: 5 L
Max Qty Cargo: 60 L
Vessel Stow Req: B

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Detail IMO Information

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IMO PSN Code: GZJ
IMO Proper Shipping Name: ETHYL METHYL KETONE
IMDG Page Number: 3226
UN Number: 1193
UN Hazard Class: 3.2
IMO Packaging Group: II
Subsidiary Risk Label: -
EMS Number: 3-06
MED First Aid Guide NUM: 300

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Detail IATA Information

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IATA PSN Code: LNF
IATA UN ID Num: 1193
IATA Proper Shipping Name: ETHYL METHYL KETONE
IATA UN Class: 3
IATA Label: FLAMMABLE LIQUID
UN Packing Group: II
Packing Note Passenger: 305
Max Quant Pass: 5L
Max Quant Cargo: 60L
Packaging Note Cargo: 307

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Detail AFI Information

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AFI PSN Code: LNF
AFI Proper Shipping Name: ETHYL METHYL KETONE OR METHYL ETHYL KETONE
AFI Hazard Class: 3
AFI UN ID NUM: UN1193
AFI Packing Group: II
Special Provisions: P5
Back Pack Reference: A7.3

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HAZCOM Label

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Product ID: METHYL ETHYL KETONE
Cage: T0317
Assigned IND: Y
Company Name: EXXON CHEMICAL COMPANY, DIVISION EXXON CORP
PO Box: 3272
City: HOUSTON TX
Zipcode: 77253-3272
Health Emergency Phone: 800-726-2015
Label Required IND: Y
Date Of Label Review: 12/04/2000
Status Code: A
Year Procured: 2000
Origination Code: F
Chronic Hazard IND: Y
Eye Protection IND: YES
Skin Protection IND: YES
Signal Word: DANGER
Respiratory Protection IND: YES
Health Hazard: Moderate
Contact Hazard: Slight
Fire Hazard: Severe
Reactivity Hazard: None
Hazard And Precautions: POTENTIAL HEALTH EFFECTS: EYE CONTACT: SEVERELY IRRITATING. IF NOT REMOVED PROMPTLY, WILL INJURE EYE TISSUE, WHICH MAY RESULT IN PERMANENT DAMAGE. SKIN CONTACT: FREQUENT/PROLONGED CONTACT MAY IRRITATE AND CAUSE DERMATITIS. LOW ORDER OF TOXICITY. INHALATION: VAPOR CONCENTRATIONS ABOVE EXPOSURE LEVELS ARE IRRITATING TO EYES AND RESPIRATORY TRACT, MAY CAUSE HEADACHES AND DIZZINESS, ARE ANESTHETIC AND MAY HAVE OTHER CENTRAL NERVOUS SYSTEM EFFECTS. INGESTION: SMALL AMOUNTS OF THELIQUID ASPIRATED INTO THE RESPIRATORY SYSTEM DURING INGESTION, OR FROM VOMITING, MAY CAUSE PULMONARY EDEMA. CHRONIC EFFEC TS: NO NEUROTOXIC EFFECTS.

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----------Record 18 ----------
NSN: 6810-00-227-1272
LSN:
RESPONSIBLE PARTY CAGE: 3E898
PRODUCT ID: MINERAL SPIRITS,PAINT THINNER
MFN: 01
MSDS DATE: 02/01/1987
SUBMITTER SERVICE: D
SUBMITTER ACTIVITY: DG
TECH REVIEW: 07/20/1990
STATUS CD: C
REVIEW IND: Y
PROPRIETARY IND: N
EDI: N
SPECIAL PROJECT CD: N
PUBLISHED: Y
FSC: 6810
NIIN: 00-227-1272
LIIN:
MSDS SERIAL NUM: BHVZT
ARTICLE: N
KIT PART: N
ARCHIVE IND: N
RESP PARTY COMPANY NAME: WILLARD PRODUCTS
RESP PARTY STREET ADDRESS: 70 CHEMICAL WAY
RESP PARTY P.O. BOX: 249
RESP PARTY CITY: REDWOOD CITY
RESP PARTY STATE: CA
RESP PARTY ZIP CODE: 94064
RESP PARTY COUNTRY: US
RESP PARTY INFO PHONE NO: 415-365-3300
RESP PARTY EMERGENCY PHONE: 415-365-3300
RESP PARTY OTHER MSDS NUMBER:
PREPARER'S NAME: N/K
CHEMTREC IND/PHONE:
CONTRACTOR CAGE: 3E898
CONTRACTOR ASSIGNED IND: N
CONTRACTOR COMPANY NAME: WILLARD PRODUCTS
CONTRACTOR STREET ADDRESS: 70 CHEMICAL WAY
CONTRACTOR P.O. BOX:
CONTRACT CITY: REDWOOD CITY
CONTRACTOR STATE: CA
CONTRACTOR ZIP CODE: 94063-2715
CONTRACTOR COUNTRY: US
CONTRACTOR PHONE: 415-365-3300
CONTRACT NUMBER:
ITEM MANAGER: S9G
ITEM NAME: NAPHTHA,ALIPHATIC
SPECIFICATION NUMBER: NK
TYPE/GRADE/CLASS: NK
UNIT OF ISSUE: CN
QUANTITATIVE EXPRESSION: 00000000005GL
UI CONTAINER QTY: NK
TYPE OF CONTAINER:
CAS: 64742-88-7
CAS CODE: M
RTECS NUMBER: 1003692SN
RTECS CODE: M
INGREDIENT NAME: NAPHTHA, MEDIUM ALIPHATIC
% TEXT: 100.0
ENVIRONMENTAL WEIGHT %:

OSHA PEL: NOT ESTABLISHED
OSHA PEL CODE: M
OTHER REC LIMITS: NOT ESTABLISHED
OSHA STEL:
OSHA STEL CODE:
ACGIH TLV: NOT ESTABLISHED
ACGIH TLV CODE: M
ACGIH STEL: N/P
ACGIH STEL CODE:
EPA RPT QTY:
DOT RPT QTY:
OZONE DEPLETING CHEMICAL: N
LD50 LC50 MIXTURE: N/K
ROUTE OF ENTRY INDS-INHALATION: YES
ROUTE OF ENTRY INDS-SKIN: YES
ROUTE OF ENTRY INDS-INGESTION: YES
HEALTH HAZ ACUTE AND CHRONIC: ACUTE:IRRITATION OF EYES,SKIN,RESPIRATORY OR G.I.TRACTS;CNS EFFECTS LIKE HEADACHE,DIZZINESS,NAUSEA,VOMITING AND POSSIBLE UNCONSCIOUSNESS;REDNESS OR BURNS OF EYES/SKIN POSSIBLE.CHRONIC:DRYING OF SKIN, DEFATTING OR DERMATITIS.
CARCINOGENICITY INDS - NTP: NO
CARCINOGENICITY INDS - IARC: NO
CARCINOGENICITY INDS - OSHA: NO
EXPLANATION CARCINOGENICITY: DATA PER MSDS
SIGNS/SYMPTOMS OVEREXPOSURE: SEE HEALTH HAZARDS DATA.
MED COND AGGRAVATED BY EXP: PERSONS WITH A HISTORY OF AILMENTS OR WITH A PRE-EXISTING DISEASE INVOLVING THE EYES, SKIN, OR RESPIRATORY TRACT MAY BE AT INCREASED RISK FROM EXPOSURE.
FIRST AID: INHALATION:REMOVE TO FRESH AIR. RESUSCITATE IF NOT BREATHING. GET MEDICAL ATTENTION. EYES:IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR 15 MINUTES HOLDING EYELIDS OPEN. GET MEDICAL ATTENTION. SKIN:REMOVE CONTAMINATED CLOTHING. WASH WITH SOAP AND WATER. IF IRRITATION PERSISTS, GET MEDICAL ADVICE.
INGESTION: DO NOT INDUCE VOMITING. GIVE NOTHING BY MOUTH IF UNCONSCIOUS. GET IMMEDIATE MEDICAL ATTENTION.
SPILL RELEASE PROCEDURES: USE PROPER PERSONAL PROTECTION;CONTAIN FREE MATERIAL IF POSSIBLE;USE SUITABLE INERT ABSORBENT MATERIAL AND RECOVER FOR PROPER DISPOSAL IN AN APPROVED CONTAINER.
NEUTRALIZING AGENT: NOT APPLICABLE.
WASTE DISPOSAL METHODS: CONSULT LOCAL AUTHORITIES.DISPOSAL MUST BE MADE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL LAWS AND REGULATIONS.
HANDLING/STORAGE PRECAUTIONS: STORE IN A COOL, DRY, WELL VENTILATED AREA. KEEP CONTAINERS TIGHTLY CLOSED WHEN NOT IN USE. PROTECT CONTAINERS FROM PHYSICAL DAMAGE.
OTHER PRECAUTIONS: DO NOT TAKE INTERNALLY. DO NOT BREATHE MIST. AVOID PROLONGED OR REPEATED BREATHING OF VAPOR. AVOID CONTACT WITH EYES. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING.
FLASH PT METHOD: N/P
FLASH PT:
FLASH POINT TEXT: 100F,38C
AUTOIGNITION TEMP:
AUTOIGNITION TEMP TEXT: N/A
LOWER LIMITS: 1.0
UPPER LIMITS: N/K
EXTINGUISHING MEDIA: USE CARBON DIOXIDE, FOAM, DRY CHEMICAL, OR WATER FOG.
FIRE FIGHTING PROCEDURES: FIRE FIGHTERS SHOULD USE NIOSH APPROVED SCBA & FULL PROTECTIVE EQUIPMENT WHEN FIGHTING CHEMICAL FIRE. USE WATER SPRAY TO COOL NEARBY CONTAINERS EXPOSED TO FIRE.
UNUSUAL FIRE/EXPLOSION HAZARD: VAPORS MAY IGNITE.FIRE OR EXCESSIVE HEAT MAY CAUSE PRODUCTION OF HAZARDOUS DECOMPOSITION PRODUCTS.
RESPIRATORY PROTECTION: USE NIOSH/MSHA APPROVED RESPIRATOR AS REQUIRED IF ABOVE PEL/TLV OR SCBA IN AN ENCLOSED AREA.

VENTILATION: LOCAL/GENERAL TO MAINTAIN PEL/TLV.
PROTECTIVE GLOVES: NEOPRENE, NITRILE, OR NATURAL RUBBER
EYE PROTECTION: SAFETY GOGGLES WITH OPTIONAL FACE SHIELD
OTHER PROTECTIVE EQUIPMENT: EYE WASH STATION AND SAFETY SHOWER,WORK CLOTHING AND APRON AS REQUIRED.
WORK HYGENIC PRACTICES: OBSERVE GOOD PERSONAL HYGIENE PRACTICES AND RECOMMENDED PROCEDURES. DO NOT WEAR CONTAMINATED CLOTHING OR FOOTWEAR.
SUPPLEMENTAL SAFETY & HEALTH: AVOID PROLONGED OR REPEATED EXPOSURE. DO NOT GET ON SKIN OR IN EYES. DO NOT BREATHE VAPORS OR MISTS.
HCC: F4
NRC/STATE LIC NO: N/R
NET PROP WT FOR AMMO: N/R
BOILING POINT:
B.P. TEXT: 300F,149C
MELT/FREEZE PT:
M.P/F.P TEXT: N/K
DECOMP TEMP:
DECOMP TEXT: UNKNOWN
VAPOR PRES: 2 MMHG
VAPOR DENSITY: 4.9
SPEC GRAVITY: 1.77
VOLATILE ORG CONTENT %:
VOC GRAMS/LITER:
VOC POUNDS/GALLON:
PH: N/K
VISCOSITY: N/P
EVAPORATION RATE & REFERENCE: 70(N-BUTYL ACETATE=1)
SOLUBILITY IN WATER: N/K
APPEARANCE AND ODOR: CLEAR LIQUID,HYDROCARBON ODOR
PERCENT VOLATILES BY VOLUME: 100.0
CORROSION RATE: UNKNOWN
STABILITY INDICATOR: YES
STABILITY CONDITIONS TO AVOID: HIGH TEMPERATURES, SPARKS, AND OPEN FLAMES
MATERIALS TO AVOID:
STRONG OXIDIZING AGENTS
HAZARDOUS DECOMPOSITION PRODUCTS CARBON MONOXIDE, CARBON DIOXIDE AND OTHER UNIDENTIFIED COMPONENTS.
HAZARDOUS POLYMERIZATION INDICAT NO
CONDITIONS TO AVOID POLYMERIZATI NOT APPLICABLE
TOXICOLOGICAL INFORMATION: N/P
ECOLOGICAL INFORMATION: N/P
TRANSPORT INFORMATION: N/P
SARA TITLE III: N/P
FEDERAL REGULATORY: N/P
STATE REGULATORY INFORMATION: N/P
OTHER INFORMATION: N/P
TRANS RESPONSIBLE PARTY CAGE: 3E898
PRODUCT ID: MINERAL SPIRITS,PAINT THINNER
MSDS PREPARED DATE: 02/01/1987
REVIEW DATE: 07/20/1990
TRANS MFN: 1
TRANS SUBMITTER SERVICE: D
TRANS SUBMITTER ACTIVITY: DG
TRANS STATUS CD: C
TRANS ID NO: 57918
ARTICLE W/O MSDS: N
TECH ENTRY NOS SHIPPING NAME: CONTAIN MINERAL SPIRITS
RADIOACTIVITY:
FORM:
NET EXPLOSIVE WEIGHT:
COAST GUARD AMMO CODE:

MAGNETISM: N/P
NET UNIT WEIGHT: 73.72 LBS
AF MMAC CODE:
DOD EXEMPTION NUM:
LIMITED QUANTITY IND:
MULTIPLE KIT NUMBER: 0
KIT INDICATOR: N
KIT PART INDICATOR: N
REVIEW INDICATOR: Y
TRANS UNIT OF ISSUE: CN
CONTAINER QTY: NK
TYPE OF CONTAINER:
ADDITIONAL DATA:
DOT PSN CODE: LKZ
SYMBOLS:
DOT PROPER SHIPPING NAME: PETROLEUM DISTILLATES, N.O.S. OR PETROLEUM PRODUCTS, N.O.S.
DOT PSN MODIFIER:
HAZARD CLASS: 3
UN ID NUM: UN1268
DOT PACKAGING GROUP: III
LABEL: FLAMMABLE LIQUID
SPECIAL PROVISION: B1,T7,T30
PACKAGING EXCEPTION:
NON BULK PACK: 203
BULK PACK: 242
MAX QTY PASS: 60 L
MAX QTY CARGO: 220 L
VESSEL STOW REQ: A
WATER/SHIP/OTHER REQ:
IMO PSN CODE: LMH
IMO PROPER SHIPPING NAME: PETROLEUM DISTILLATES, N.O.S. o
IMO PSN MODIFIER:
IMDG PAGE NUMBER: 3375
UN NUMBER: 1268
UN HAZARD CLASS: 3.3
IMO PACKAGING GROUP: III
SUBSIDIARY RISK LABEL: -
EMS NUMBER: 3-07
MED FIRST AID GUIDE NUM: 311
IATA PSN CODE: TJB
IATA UN ID NUM: 1268
IATA PROPER SHIPPING NAME: PETROLEUM DISTILLATES, N.O.S.
IATA PSN MODIFIER:
IATA UN CLASS: 3
SUBSIDIARY RISK CLASS:
IATA LABEL: FLAMMABLE LIQUID
UN PACKAGING GROUP: III
PACKAGING NOTE PASSENGER: 309
MAX QUANT PASS: 60L
PACKAGING NOTE CARGO: 310
MAX QUANT CARGO: 220L
EXCEPTIONS:
AFI PSN CODE: TJB
AFI SYMBOLS:
AFI PROPER SHIPPING NAME: PETROLEUM DISTILLATES, N.O.S.
AFI PSN MODIFIER:
AFI HAZARD CLASS: 3
AFI UN ID NUM: UN1268
AFI PACKAGING GROUP: III
AFI LABEL:

SPECIAL PROVISIONS: P5
BASIC PACK REFERENCE: A7.3
LABEL PRODUCT ID: MINERAL SPIRITS,PAINT THINNER
LABEL CAGE: 3E898
ASSIGNED IND: N
LABEL COMPANY NAME: WILLARD PRODUCTS
LABEL STREET: 70 CHEMICAL WAY
LABEL P.O. BOX:
LABEL CITY: REDWOOD CITY
LABEL STATE: CA
LABEL ZIP CODE: 94063-2715
LABEL COUNTRY: US
HEALTH EMERGENCY PHONE NUM: 415-365-3300
LABEL REQUIRED IND: Y
DATE OF LABEL REVIEW: 07/20/1990
STATUS CODE: C
MFG LABEL NO: N/K
LABEL DATE: 07/20/1990
YEAR PROCURED: 1990
ORIGINATION CODE: F
CHRONIC HAZARD IND: N/P
EYE PROTECTION IND: YES
SKIN PROTECTION IND: YES
RESPIRATORY PROTECTION IND: YES
SIGNAL WORD: WARNING
HEALTH HAZARD: Moderate
CONTACT HAZARD: Moderate
FIRE HAZARD: Moderate
REACTIVITY HAZARD: None
HAZARD AND PRECAUTIONS: MAY BE POISONOUS IF INHALED OR ABSORBED THROUGH SKIN. VAPORS MAY CAUSE DIZZINESS OR SUFFOCATION. CONTACT MAY IRRITATE OR BURN SKIN AND EYES. FIRE MAY PRODUCE IRRITATING OR POISONOUS GASES. RUNOFF FROM FIRE CONTROL OR DILUTION WATER MAY CAUSE POLLUTION. MAY CAUSE IRRITATION OF EYES, SKIN, RESPIRATORY OR G.I. TRACTS, HEADACHE, DIZZINESS, NAUSEA, VOMITING. STORE IN A COOL, DRY, WELL VENTILATED AREA. KEEP CONTAINERS TIGHTLY CLOSED WHEN NOT IN USE. PROTECT CONTAINERS FROM PHYSICAL DAMAGE.F IRST AID:IF INGESTED OR INHALED,REMOVE TO FRESH AIR AND CONSULT A PHYSICIAN.FOR EYES AND SKIN,FLUSH WITH PLENTY OF WATER FOR ABOUT 15-20 MINUTES AND SEEK MEDICAL HELP.

----------Record 1 ----------
NSN: 9150-00-405-2987
LSN:
RESPONSIBLE PARTY CAGE: 01326
PRODUCT ID: WOLF'S HEAD SPECIAL DUTY MOTOR OIL-40
MFN: 01
MSDS DATE: 11/13/1985
SUBMITTER SERVICE: D
SUBMITTER ACTIVITY: DG
TECH REVIEW: 04/22/1993
STATUS CD: C
REVIEW IND: Y
PROPRIETARY IND: Y
EDI: N
SPECIAL PROJECT CD: N
PUBLISHED: Y
FSC: 9150
NIIN: 00-405-2987
LIIN:
MSDS SERIAL NUM: BQMDK
ARTICLE: N
KIT PART: N
ARCHIVE IND: N
RESP PARTY COMPANY NAME: PENNZOIL CO
RESP PARTY STREET ADDRESS: 700 MILIAM PENNZOIL PL
RESP PARTY P.O. BOX: 2967
RESP PARTY CITY: HOUSTON
RESP PARTY STATE: TX
RESP PARTY ZIP CODE: 77252
RESP PARTY COUNTRY: US
RESP PARTY INFO PHONE NO: 713-546-4000
RESP PARTY EMERGENCY PHONE: 713-546-4000
RESP PARTY OTHER MSDS NUMBER:
PREPARER'S NAME: N/P
CHEMTREC IND/PHONE:
CONTRACTOR CAGE: 01326
CONTRACTOR ASSIGNED IND: N
CONTRACTOR COMPANY NAME: PENNZOIL CO
CONTRACTOR STREET ADDRESS: 700 MILIAM PENNZOIL PL
CONTRACTOR P.O. BOX: 2967
CONTRACT CITY: HOUSTON
CONTRACTOR STATE: TX
CONTRACTOR ZIP CODE: 77252
CONTRACTOR COUNTRY: US
CONTRACTOR PHONE: 713-236-6070
CONTRACT NUMBER:
ITEM MANAGER: S9G
ITEM NAME: LUBRICATING OIL,ENGINE
SPECIFICATION NUMBER: MIL-L-2104E
TYPE/GRADE/CLASS: 40 GRADE
UNIT OF ISSUE: GL
QUANTITATIVE EXPRESSION: NK
UI CONTAINER QTY: UNKNOWN
TYPE OF CONTAINER: UNKNOWN
CAS:
CAS CODE: X
RTECS NUMBER: 1004916BL
RTECS CODE: M
INGREDIENT NAME: BASE LUBRICATING OIL MIXTURE
% TEXT: 85-90
ENVIRONMENTAL WEIGHT %:

OSHA PEL: NOT ESTABLISHED
OSHA PEL CODE: M
OTHER REC LIMITS: NONE RECOMMENDED
OSHA STEL:
OSHA STEL CODE:
ACGIH TLV: NOT ESTABLISHED
ACGIH TLV CODE: M
ACGIH STEL: N/P
ACGIH STEL CODE:
CAS:
CAS CODE: X
RTECS NUMBER: 1008820DI
RTECS CODE: M
INGREDIENT NAME: DETERGENT/INHIBITOR SYSTEM
% TEXT: 10-15
ENVIRONMENTAL WEIGHT %:
OSHA PEL: NOT ESTABLISHED
OSHA PEL CODE: M
OTHER REC LIMITS: NONE RECOMMENDED
OSHA STEL:
OSHA STEL CODE:
ACGIH TLV: NOT ESTABLISHED
ACGIH TLV CODE: M
ACGIH STEL: N/P
ACGIH STEL CODE:
LD50 LC50 MIXTURE: NO VALUES ARE GIVEN
ROUTE OF ENTRY INDS-INHALATION: YES
ROUTE OF ENTRY INDS-SKIN: YES
ROUTE OF ENTRY INDS-INGESTION: YES
HEALTH HAZ ACUTE AND CHRONIC: PRACTICALLY NON-IRRITATING TO THE EYE UPON DIRECT CONTACT. SKIN: PROLONGED OR REPEATED CONTACT MAY RESULT IN DERMATITIS WHICH IS CHARCATERIZED BY DRYNESS, CHAPPING, AND REDDENING. INHALATION: THIS PRODUCT HAS A LOW VAPOR PRESSURE AND IS NOT EXPECTED TO P
ESENT AN INHALATION HAZARD. INGESTION: HAS LAXATIVE PROPERTIES.
CARCINOGENICITY INDS - NTP: NO
CARCINOGENICITY INDS - IARC: NO
CARCINOGENICITY INDS - OSHA: NO
EXPLANATION CARCINOGENICITY: N/P
SIGNS/SYMPTOMS OVEREXPOSURE: ON RARE OCCASIONS, PROLONGED AND REPEATED EXPOSURER MAY CAUSE PULMONARY DISEASE SUCH AS CHRONIC LUNG INFLAMMATION. SIGNS OF LUNG INVOLVEMENT MAY INCLUDE INCREASED RESPIRATION RATE, INCREASED HEART RATE, BLUISH DISCOLORATION OF THE SKIN, COU GHING, CHOKING AND GAGGING.
MED COND AGGRAVATED BY EXP: NONE SPECIFIED BY MANUFACTURER.
FIRST AID: SKIN: WASH WITH SOAP AND WATER. REMOVE CONTAMINATED CLOTHING. IF MATERIAL IS HOT, SUBMERGE INJURED AREA IN COLD WATER. INHALATION: NOT EXPECTED TO BE A PROBLEM. EYE: FLUSH THOROUGHLY WITH WATER. IF MATERIAL IS HOT, TREAT FOR THERMAL BURNS. GET MEDICAL ATTENTION.
INGESTION: DO NOT INDUCE VOMITING. SEEK MEDICAL ATTENTION.
SPILL RELEASE PROCEDURES: REPORT SPILL TO PROPER AUTHORITIES. CONTAIN SPILL IMMEDIATELY. DO NOT ALLOW SPILL TO ENTER SEWERS OR WATERCOURSE. REMOVE ALL SOURCES OF IGNITION. ABSORB WITH INERT MATERIAL SUCH AS SAND, CLAY. LARGE SPILL MAY BE PUCKED UP USING VACUUM PUMPS .
NEUTRALIZING AGENT: NONE SPECIFIED BY MANUFACTURER.
WASTE DISPOSAL METHODS: CONSULT YOUR LOCAL ENVIRONMENTAL OFFICER. PRODUCT IS SUITABLE FOR BURNING IN AN ENCLOSED CONTROLLED BURNER FOR FUEL VALUE. PRODUCT IS SUITABLE FOR PROCESSING BY AN APPROVED RECYCLING FACILITY. THESE METHODS SUBJECT TO USER COMPLIANCE OF REGULATIONS.
HANDLING/STORAGE PRECAUTIONS: DO NOT TRANSFER TO UNMARKED CONTAINERS. STORE IN CLOSED CONTAINERS AWAY FROM HEAT, SPARKS, OPEN FLAME. FIRE EXTINGUISHERS SHOULD BE READILY AVAILABLE.
OTHER PRECAUTIONS: MINIMIZE SKIN CONTACT. WASH WITH SOAP AND WATER BEFORE

EATING, DRINKING, SMOKING OR USING TOILET FACILITIES. LAUNDER CONTAMINATED CLOTHING BEFORE REUSE.
FLASH PT METHOD: COC
FLASH PT:
FLASH POINT TEXT: 455F,235C
AUTOIGNITION TEMP:
AUTOIGNITION TEMP TEXT: >800F
LOWER LIMITS: N/R
UPPER LIMITS: N/R
EXTINGUISHING MEDIA: CARBON DIOXIDE, FOAM, DRY CHEMICAL
FIRE FIGHTING PROCEDURES: WATER MAY CAUSE FROTHING. USE WATER TO KEEP FIRE EXPOSED CONTAINERS COOL. FIREFIGHTERS MUST USE SELF-CONTAINED BREATHING APPARATUS.
UNUSUAL FIRE/EXPLOSION HAZARD: DENSE SMOKE MAY BE GENERATED WHILE BURNING
RESPIRATORY PROTECTION: NO SPECIAL REQUIREMENTS UNDER ORDINARY CONDITIONS OF USE AND WITH ADEQUATE VENTILATION.
VENTILATION: NO SPECIAL REQUIREMENTS UNDER ORDINARY CONDITIONS OF USE.
PROTECTIVE GLOVES: CHEMICAL RESISTANT GLOVES (NITRILE BEST)
EYE PROTECTION: NO SPECIAL EQUIPMENT REQUIRED.
OTHER PROTECTIVE EQUIPMENT: NO SPECIAL PRECAUTIONS REQUIRED.
WORK HYGENIC PRACTICES: MINIMIZE SKIN CONTACT. WASH WITH SOAP AND WATER BEFORE EATING, DRINKING, SMOKING OR USING TOILET FACILITIES.
SUPPLEMENTAL SAFETY & HEALTH: NONE
HCC: V6
NRC/STATE LIC NO: N/R
NET PROP WT FOR AMMO: N/R
BOILING POINT:
B.P. TEXT: >1000F,>538
MELT/FREEZE PT:
M.P/F.P TEXT: 15.0F,-9.4C
DECOMP TEMP:
DECOMP TEXT: N/A
VAPOR PRES: N/R
VAPOR DENSITY: N/R
SPEC GRAVITY: 0.896
VOLATILE ORG CONTENT %:
VOC GRAMS/LITER:
VOC POUNDS/GALLON:
PH: N/R
VISCOSITY: N/P
EVAPORATION RATE & REFERENCE: N/R
SOLUBILITY IN WATER: NEGLIGIBLE
APPEARANCE AND ODOR: OPAQUE, DARK COLOR, LUBE OIL ODOR.
PERCENT VOLATILES BY VOLUME: N/R
CORROSION RATE: UNKNOWN
STABILITY INDICATOR: YES
STABILITY CONDITIONS TO AVOID: NONE SPECIFIED BY MANUFACTURER.
MATERIALS TO AVOID:
STRONG OXIDIZERS.
HAZARDOUS DECOMPOSITION PRODUCTS CARBON MONOXIDE, CARBON DIOXIDE, AND OTHER OXIDES MAY BE GENERATED.
HAZARDOUS POLYMERIZATION INDICAT NO
CONDITIONS TO AVOID POLYMERIZATI NONE SPECIFIED BY MANUFACTURER.
TOXICOLOGICAL INFORMATION: N/P
ECOLOGICAL INFORMATION: N/P
TRANSPORT INFORMATION: N/P
SARA TITLE III: N/P
FEDERAL REGULATORY: N/P
STATE REGULATORY INFORMATION: N/P
OTHER INFORMATION: N/P
TRANS RESPONSIBLE PARTY CAGE: 01326

PRODUCT ID: WOLF'S HEAD SPECIAL DUTY MOTOR OIL-40
MSDS PREPARED DATE: 11/13/1985
REVIEW DATE: 04/22/1993
TRANS MFN: 1
TRANS SUBMITTER SERVICE: D
TRANS SUBMITTER ACTIVITY: DG
TRANS STATUS CD: C
TRANS ID NO: 70853
ARTICLE W/O MSDS: N
TECH ENTRY NOS SHIPPING NAME:
RADIOACTIVITY: N/R
FORM:
NET EXPLOSIVE WEIGHT: N/R
COAST GUARD AMMO CODE: N/R
MAGNETISM: N/P
NET UNIT WEIGHT:
AF MMAC CODE:
DOD EXEMPTION NUM: N/R
LIMITED QUANTITY IND:
MULTIPLE KIT NUMBER: 0
KIT INDICATOR: N
KIT PART INDICATOR: N
REVIEW INDICATOR: Y
TRANS UNIT OF ISSUE: GL
CONTAINER QTY: UNKNOWN
TYPE OF CONTAINER: UNKNOWN
ADDITIONAL DATA:
DOT PSN CODE: ZZZ
SYMBOLS: N/R
DOT PROPER SHIPPING NAME: NOT REGULATED BY THIS MODE OF TRANSPORTATION
DOT PSN MODIFIER:
HAZARD CLASS: N/R
UN ID NUM: N/R
DOT PACKAGING GROUP: N/R
LABEL: N/R
SPECIAL PROVISION: N/R
PACKAGING EXCEPTION: N/R
NON BULK PACK: N/R
BULK PACK: N/R
MAX QTY PASS: N/R
MAX QTY CARGO: N/R
VESSEL STOW REQ: N/R
WATER/SHIP/OTHER REQ: N/R
IMO PSN CODE: ZZZ
IMO PROPER SHIPPING NAME: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IMO PSN MODIFIER:
IMDG PAGE NUMBER: N/R
UN NUMBER: N/R
UN HAZARD CLASS: N/R
IMO PACKAGING GROUP: N/R
SUBSIDIARY RISK LABEL: N/R
EMS NUMBER: N/R
MED FIRST AID GUIDE NUM: N/R
IATA PSN CODE: ZZZ
IATA UN ID NUM: N/R
IATA PROPER SHIPPING NAME: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IATA PSN MODIFIER:
IATA UN CLASS: N/R
SUBSIDIARY RISK CLASS: N/R
IATA LABEL: N/R
UN PACKAGING GROUP: N/R

ORIGINAL (Red)

PACKAGING NOTE PASSENGER: N/R
MAX QUANT PASS: N/R
PACKAGING NOTE CARGO: N/R
MAX QUANT CARGO: N/R
EXCEPTIONS: N/R
AFI PSN CODE: ZZZ
AFI SYMBOLS:
AFI PROPER SHIPPING NAME: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI PSN MODIFIER:
AFI HAZARD CLASS: N/R
AFI UN ID NUM: N/R
AFI PACKAGING GROUP: N/R
AFI LABEL: N/R
SPECIAL PROVISIONS: N/A
BASIC PACK REFERENCE: N/A
LABEL PRODUCT ID: WOLF'S HEAD SPECIAL DUTY MOTOR OIL-40
LABEL CAGE: 01326
ASSIGNED IND: N
LABEL COMPANY NAME: PENNZOIL CO
LABEL STREET: 700 MILIAM PENNZOIL PL
LABEL P.O. BOX: 2967
LABEL CITY: HOUSTON
LABEL STATE: TX
LABEL ZIP CODE: 77252
LABEL COUNTRY: US
HEALTH EMERGENCY PHONE NUM: 713-546-4000
LABEL REQUIRED IND: Y
DATE OF LABEL REVIEW: 12/16/1998
STATUS CODE: C
MFG LABEL NO:
LABEL DATE: 12/16/1998
YEAR PROCURED: N/K
ORIGINATION CODE: G
CHRONIC HAZARD IND: N/P
EYE PROTECTION IND: N/P
SKIN PROTECTION IND: N/P
RESPIRATORY PROTECTION IND: N/P
SIGNAL WORD: N/P
HEALTH HAZARD:
CONTACT HAZARD:
FIRE HAZARD:
REACTIVITY HAZARD:
HAZARD AND PRECAUTIONS: PRACTICALLY NON-IRRITATING TO THE EYE UPON DIRECT CONTACT. SKIN: PROLONGED OR REPEATED CONTACT MAY RESULT IN DERMATITIS WHICH IS CHARCATERIZED BY DRYNESS, CHAPPING, AND REDDENING. INHALATION: THIS PRODUCT HAS A LOW VAPOR PRESSURE AND IS NOT EXPECTED TO PRESENT AN INHALATION HAZARD. INGESTION: HAS LAXATIVE PROPERTIES. ON RARE OCCASIONS, PROLONGED AND REPEATED EXPOSURER MAY CAUSE PULMONARY DISEASE SUCH AS CHRONIC LUNG INFLAMMATION. SIGNS OF LUNG INVOLVEMENT MAY INCLUDE INCREASED RESPIRATION RATE, INCREASE HEART RATE, BLUISH DISCOLORATION OF THE SKIN, COUGHING, CHOKING, AND GAGGING.

----------Record 1 ----------
NSN: 6850-00-264-9038
LSN:
RESPONSIBLE PARTY CAGE: 4N760
PRODUCT ID: PD-680A TY 1
MFN: 01
MSDS DATE: 09/01/1990
SUBMITTER SERVICE: D
SUBMITTER ACTIVITY: DG
TECH REVIEW: 06/08/1992
STATUS CD: C
REVIEW IND: Y
PROPRIETARY IND: N
EDI: N
SPECIAL PROJECT CD: N
PUBLISHED: Y
FSC: 6850
NIIN: 00-264-9038
LIIN:
MSDS SERIAL NUM: BDRBM
ARTICLE: N
KIT PART: N
ARCHIVE IND: N
RESP PARTY COMPANY NAME: CHEMICAL SPECIALISTS & DEVELOPMENT INC.
RESP PARTY STREET ADDRESS: 5 HACKBERRY LANE
RESP PARTY P.O. BOX: 687
RESP PARTY CITY: CONROE
RESP PARTY STATE: TX
RESP PARTY ZIP CODE: 77305
RESP PARTY COUNTRY: US
RESP PARTY INFO PHONE NO: 409-756-1065
RESP PARTY EMERGENCY PHONE: 800-424-9300
RESP PARTY OTHER MSDS NUMBER:
PREPARER'S NAME: N/P
CHEMTREC IND/PHONE:
CONTRACTOR CAGE: 4N760
CONTRACTOR ASSIGNED IND: N
CONTRACTOR COMPANY NAME: CHEMICAL SPECIALISTS AND DEVELOPMENT
CONTRACTOR STREET ADDRESS: 5 HACKBERRY LANE
CONTRACTOR P.O. BOX: 3087
CONTRACT CITY: CONROE
CONTRACTOR STATE: TX
CONTRACTOR ZIP CODE: 77305
CONTRACTOR COUNTRY: US
CONTRACTOR PHONE: 409-756-1065/1083 FAX DAVID /SHANAN
CONTRACT NUMBER:
ITEM MANAGER: S9G
ITEM NAME: DRY CLEANING SOLVENT
SPECIFICATION NUMBER: P-D-680B
TYPE/GRADE/CLASS: TYPE I
UNIT OF ISSUE: CN
QUANTITATIVE EXPRESSION: 00000000005GL
UI CONTAINER QTY: 5 GAL
TYPE OF CONTAINER: CAN
CAS: 64742-89-8
CAS CODE: M
RTECS NUMBER: 1004249NP
RTECS CODE: M
INGREDIENT NAME: ALIPHATIC PETROLEUM DISTILLATES. [SOLVENT NAPHTHA (PETROLEUM), LIGHT ALIPHATIC].
% TEXT: 100

ENVIRONMENTAL WEIGHT %:
OSHA PEL: 100 PPM
OSHA PEL CODE: M
OTHER REC LIMITS: NONE SPECIFIED
OSHA STEL:
OSHA STEL CODE:
ACGIH TLV: 100 PPM 9192
ACGIH TLV CODE: M
ACGIH STEL: N/P
ACGIH STEL CODE:
EPA RPT QTY:
DOT RPT QTY:
OZONE DEPLETING CHEMICAL: N
LD50 LC50 MIXTURE: UNKNOWN
ROUTE OF ENTRY INDS-INHALATION: YES
ROUTE OF ENTRY INDS-SKIN: NO
ROUTE OF ENTRY INDS-INGESTION: YES
HEALTH HAZ ACUTE AND CHRONIC: EYES: MAY CAUSE MILD IRRITATION. SKIN: PROLONGED CONTACT MAY CAUSE IRRITATION, DRYING AND CRACKING. INHALATION: BREATHING HIGH CONCEMTRATIONS OF VAPORS MAY CAUSE IRRITATION OF THE NOSE, THROAT AND SIGNS OF DEPRESSION. INGESTION: MAY CAUSE IRRITATION OF THE DIGESTIVE TRACT AND SIGNS OF DEPRESSION.
CARCINOGENICITY INDS - NTP: NO
CARCINOGENICITY INDS - IARC: NO
CARCINOGENICITY INDS - OSHA: NO
EXPLANATION CARCINOGENICITY: THIS COMPOUND HAS NOT BEEN IDENTIFIED AS A CARCINOGEN BY NTP, IARC, OR OSHA.
SIGNS/SYMPTOMS OVEREXPOSURE: EYES, SKIN AND RESPIRATORY TRACT IRRITATION. CENTRAL NERVOUS SYSTEM DEPRESSION MAY BE EVIDENCED BY HEADACHE, DROWSINESS, DIZZINESS, NAUSEA, LOSS OF COORDINATION, AND FATIGUE. REPORTS HAVE ASSOCIATED REPEATED OCCUPATIONAL OVEREXPOSURE WITH PERMENANT BRAIN AND NERVOUS SYSTEM DAMAGE.
MED COND AGGRAVATED BY EXP: PRE-EXISTING EYE, SKIN AND RESPIRATORY DISORDERS MAY BE AGGRAVATED BY EXPOSURE TO THIS PRODUCT.
FIRST AID: EYES: FLUSH WITH LARGE AMOUMTS OF WATER. IF IRRITATION PERSISTS GET MEDICAL ATTENTION. SKIN: REMOVE CONTAMINATED CLOTHING. WASH AREA WITH SOAP AND WATER. IF IRRITATION PERSISTS GET MEDICAL ATTENTION. INHALATION: REMOVE TO FRESH AIR. GIVE CP R IF NOT BREATHING. IF BREATHING DIFFICULT GIVE OXYGEN. GET MEDICAL ATTENTION. INGESTION: DO NOT INDUCE VOMITING. GET MEDICAL ATTENTION.
SPILL RELEASE PROCEDURES: ELIMINATE SOURCES OF IGNITION. WEAR APPROPRIATE RESPIRATOR AND PROTECTIVE CLOTHING. STOP SOURCE OF LEAK. DIKE TO PREVENT FROM ENTERING SEWERS, STORM DRAINS AND NATURAL WATERWAYS. VACUUM OR PUMP TO SALVAGE VESSEL. ABSORB RESIDUE IN ABSORBENT MATERIAL.
NEUTRALIZING AGENT: NOT APPLICABLE
WASTE DISPOSAL METHODS: CONTACT YOUR LOCAL ENVIRONMENTAL OFFICER. DISPOSE OF WASTE IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS. IF SPILL OF ANY AMOUNT IS MADE INTO U.S. NAVIGABLE WATERS OR ADJOINING SHORELINES, NOTIFY THE NATIONAL RESPONSE CENTER (800- 424-8802)
HANDLING/STORAGE PRECAUTIONS: KEEP AWAY FROM HEAT, SPARKS AND FLAME. KEEP CONTAINERS CLOSED WHEN NOT IN USE. USE WITH ADEQUATE VENTILATION. VAPORS WHEN IGNITED MAY EXPLODE.
OTHER PRECAUTIONS: "EMPTY" CONTAINERS CAN CONTAIN EXPLOSIVE VAPORS. DO NOT CUT, DRILL, GRIND, WELD OR PERFORM SIMILAR OPERATIONS ON OR NEAR CONTAINERS. STATIC ELECTRICITY MAY CREATE A FIRE HAZARD. GROUND CONTAINERS, FIXED AND TRANSFER EQUIPMENT.
FLASH PT METHOD: TCC
FLASH PT:
FLASH POINT TEXT: 100F,38C
AUTOIGNITION TEMP:
AUTOIGNITION TEMP TEXT: N/K
LOWER LIMITS: 0.9

UPPER LIMITS: 7.0
EXTINGUISHING MEDIA: DRY CHEMICAL, CARBON DIOXIDE, FOAM OR WATER SPRAY IS RECOMMENDED.
FIRE FIGHTING PROCEDURES: WEAR FIRE FIGHTING PROTECTIVE EQUIPMENT AND A FULL FACED SELF CONTAINED BREATHING APPARATUS. COOL FIRE EXPOSED CONTAINERS WITH WATER SPRAY.
UNUSUAL FIRE/EXPLOSION HAZARD: VAPOR MAY TRAVEL LONG DISTANCES TO A SOURCE OF IGNITION, IGNITE AND FLASH BACK OR EXPLODE. VAPORS ARE HEAVIER THAN AIR AND MAY COLLECT IN LOW AREAS.
RESPIRATORY PROTECTION: AVOID PROLONGED OR REPEATED BREATHING OF VAPORS. IF EXPOSURE EXCEEDS OCCUPATIONAL EXPOSURE LIMITS, USE A NIOSH/MSHA APPROVED RESPIRATOR. EITHER AN AIR-SUPPLIED OR AIR-PURIFYING RESPIRATOR WITH ORGANIC VAPOR CARTRIDGES IS RECOMMENDED.
VENTILATION: USE EXPLOSION-PROOF LOCAL AND/OR MECHANICAL VENTILATION. AVOID OPEN ELECTRICAL SOURCES NEAR PRODUCT VAPOR AREAS.
PROTECTIVE GLOVES: GLOVES, IMPERMEABLE TO MINERAL SPIRITS.
EYE PROTECTION: CHEMICAL SAFETY GOGGLES AND FACESHIELD.
OTHER PROTECTIVE EQUIPMENT: IMPERVIOUS CLOTHING TO MINIMIZE CONTACT. RUBBER APRON AND BOOTS IF REQUIRED. PROVIDE EYE WASH STATION AND SAFETY SHOWER.
WORK HYGENIC PRACTICES: WASH AFTER HANDLING AND BEFORE EATING, DRINKING OR SMOKING. LAUNDER CONTAMINATED CLOTHING BEFORE REUSE.
SUPPLEMENTAL SAFETY & HEALTH: THE MANUFACTURERS MSDS FOR THIS NSN IS ALSO USED FOR PRODUCTS UNDER NSN 8010-00-558-7026 "THINNER, PAINT TYPE 1- REGULAR MINERAL SPIRITS" WITH SHIPPING NAME "PAINT RELATED MATERIAL".
HCC: F4
NRC/STATE LIC NO: N/R
NET PROP WT FOR AMMO: N/R
BOILING POINT:
B.P. TEXT: 308F,153C
MELT/FREEZE PT:
M.P/F.P TEXT: UNKNOWN
DECOMP TEMP:
DECOMP TEXT: UNKNOWN
VAPOR PRES: 3.1
VAPOR DENSITY: UNKNOWN
SPEC GRAVITY: 0.780
VOLATILE ORG CONTENT %:
VOC GRAMS/LITER:
VOC POUNDS/GALLON:
PH: N/K
VISCOSITY: UNKNOWN
EVAPORATION RATE & REFERENCE: 0.1 (N-BUTYL ACETATE=1)
SOLUBILITY IN WATER: INSOLUBLE
APPEARANCE AND ODOR: CLEAR, LITTLE IF ANY COLOR. SLIGHT OIL ODOR.
PERCENT VOLATILES BY VOLUME: 100
CORROSION RATE: NOT CORR
STABILITY INDICATOR: YES
STABILITY CONDITIONS TO AVOID: HIGH HEAT, OPEN FLAMES AND OTHER SOURCES OF IGNITION
MATERIALS TO AVOID:
STRONG ACIDS OR BASES, OXIDIZING AGENTS AND SELECTED AMINES.
HAZARDOUS DECOMPOSITION PRODUCTS CARBON MONOXIDE, CARBON DIOXIDE AND OTHER HYDROCARBON COMPOUNDS DURING COMBUSTION.
HAZARDOUS POLYMERIZATION INDICAT NO
CONDITIONS TO AVOID POLYMERIZATI NOT APPLICABLE
TOXICOLOGICAL INFORMATION: N/P
ECOLOGICAL INFORMATION: N/P
TRANSPORT INFORMATION: N/P
SARA TITLE III: N/P
FEDERAL REGULATORY: N/P
STATE REGULATORY INFORMATION: N/P

OTHER INFORMATION: N/P
TRANS RESPONSIBLE PARTY CAGE: 4N760
PRODUCT ID: PD-680A TY 1
MSDS PREPARED DATE: 09/01/1990
REVIEW DATE: 03/05/1996
TRANS MFN: 1
TRANS SUBMITTER SERVICE: D
TRANS SUBMITTER ACTIVITY: DG
TRANS STATUS CD: C
TRANS ID NO: 63780
ARTICLE W/O MSDS: N
TECH ENTRY NOS SHIPPING NAME: ALIPHATIC PETROLEUM DISTILLATES
RADIOACTIVITY: NOT RELEVANT
FORM:
NET EXPLOSIVE WEIGHT: N/R
COAST GUARD AMMO CODE: N/R
MAGNETISM: N/P
NET UNIT WEIGHT: 32.5 LBS
AF MMAC CODE:
DOD EXEMPTION NUM: NOT RELEVANT
LIMITED QUANTITY IND:
MULTIPLE KIT NUMBER: 0
KIT INDICATOR: N
KIT PART INDICATOR: N
REVIEW INDICATOR: Y
TRANS UNIT OF ISSUE: CN
CONTAINER QTY: 5 GAL
TYPE OF CONTAINER: CAN
ADDITIONAL DATA: THE MANUFACTURER'S MSDS FOR THIS NSN IS ALSO USED FOR PRODUCTS UNDER NSN 8010-00-558-7026 "THINNER, PAINT TYPE 1-REGULAR MINERAL SPIRITS" WITH SHIPPING NAME "PAINT RELATED MATERIAL".
DOT PSN CODE: LKZ
SYMBOLS:
DOT PROPER SHIPPING NAME: PETROLEUM DISTILLATES, N.O.S. OR PETROLEUM PRODUCTS, N.O.S.
DOT PSN MODIFIER:
HAZARD CLASS: 3
UN ID NUM: UN1268
DOT PACKAGING GROUP: III
LABEL: FLAMMABLE LIQUID
SPECIAL PROVISION: B1,T7,T30
PACKAGING EXCEPTION:
NON BULK PACK: 203
BULK PACK: 242
MAX QTY PASS: 60 L
MAX QTY CARGO: 220 L
VESSEL STOW REQ: A
WATER/SHIP/OTHER REQ:
IMO PSN CODE: LMH
IMO PROPER SHIPPING NAME: PETROLEUM DISTILLATES, N.O.S. o
IMO PSN MODIFIER:
IMDG PAGE NUMBER: 3375
UN NUMBER: 1268
UN HAZARD CLASS: 3.3
IMO PACKAGING GROUP: III
SUBSIDIARY RISK LABEL: -
EMS NUMBER: 3-07
MED FIRST AID GUIDE NUM: 311
IATA PSN CODE: TJB
IATA UN ID NUM: 1268
IATA PROPER SHIPPING NAME: PETROLEUM DISTILLATES, N.O.S.

IATA PSN MODIFIER:
IATA UN CLASS: 3
SUBSIDIARY RISK CLASS:
IATA LABEL: FLAMMABLE LIQUID
UN PACKAGING GROUP: III
PACKAGING NOTE PASSENGER: 309
MAX QUANT PASS: 60L
PACKAGING NOTE CARGO: 310
MAX QUANT CARGO: 220L
EXCEPTIONS:
AFI PSN CODE: TJB
AFI SYMBOLS:
AFI PROPER SHIPPING NAME: PETROLEUM DISTILLATES, N.O.S.
AFI PSN MODIFIER:
AFI HAZARD CLASS: 3
AFI UN ID NUM: UN1268
AFI PACKAGING GROUP: III
AFI LABEL:
SPECIAL PROVISIONS: P5
BASIC PACK REFERENCE: A7.3
LABEL PRODUCT ID: PD-680A TY 1
LABEL CAGE: 4N760
ASSIGNED IND: N
LABEL COMPANY NAME: CHEMICAL SPECIALISTS AND DEVELOPMENT
LABEL STREET: 5 HACKBERRY LANE
LABEL P.O. BOX: 3087
LABEL CITY: CONROE
LABEL STATE: TX
LABEL ZIP CODE: 77305
LABEL COUNTRY: US
HEALTH EMERGENCY PHONE NUM: 800-424-9300
LABEL REQUIRED IND: Y
DATE OF LABEL REVIEW: 06/08/1992
STATUS CODE: C
MFG LABEL NO: N/R
LABEL DATE: 06/08/1992
YEAR PROCURED: N/K
ORIGINATION CODE: F
CHRONIC HAZARD IND: N
EYE PROTECTION IND: YES
SKIN PROTECTION IND: YES
RESPIRATORY PROTECTION IND: YES
SIGNAL WORD: WARNING
HEALTH HAZARD: Moderate
CONTACT HAZARD: Slight
FIRE HAZARD: Moderate
REACTIVITY HAZARD: None
HAZARD AND PRECAUTIONS: EYES: MAY CAUSE IRRITATION. SKIN: MAY CAUSE IRRITATION, DRYING AND CRACKING. INHALATION: HIGH CONCEMTRATIONS OF VAPORS MAY CAUSE IRRITATION OF THE NOSE, THROAT AND SIGNS OF DEPRESSION. INGESTION: MAY CAUSE IRRITATION OF THE DIGESTIVE TRACT AND SIGNS OF DEPRESSION. FIRST AID: EYES: FLUSH WITH LARGE AMOUMTS OF WATER. IF IRRITATION PERSISTS GET MEDICAL ATTENTION. SKIN: REMOVE CONTAMINATED CLOTHS. WASH AREA WITH SOAP AND WATER. IF IRRITATION PERSISTS GET MEDICAL ATTENTION. INHALA TION: REMOVE TO FRESH AIR. GIVE CPR IF NOT BREATHING. IF BREATHING DIFFICULT GIVE OXYGEN. GET MEDICAL ATTENTION. INGESTION: DO NOT INDUCE VOMITING. GET MEDICAL ATTENTION.

CROWN CHEMICAL CORP -- PD 680 TYPE II, 101302

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MSDS Safety Information

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FSC: 6850
NIIN: 00-823-7935
MSDS Date: 09/16/1993
MSDS Num: BXFRB
Product ID: PD 680 TYPE II, 101302
MFN: 01
Responsible Party
Cage: 1194X
Name: CROWN CHEMICAL CORP
Address: 1888 NIRVANA AVE
City: CHULA VISTA CA 91911
Info Phone Number: 619-421-6601
Emergency Phone Number: 800-424-9300 (CHEMTREC)
Published: Y

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Contractor Summary

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Cage: 1194X
Name: CROWN CHEMICAL CORP
Address: 1888 NIRVANA AVE
City: CHULA VISTA CA 92011-6118
Phone: UNKNOWN

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Item Description Information

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Item Name: DRY CLEANING SOLVENT

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Ingredients

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Cas: 64742-47-8
RTECS #: OA5504000
Name: KEROSENE (PETROLEUM), HYDROTREATED; (PETROLEUM HYDROCARBON)
% Wt: 93
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Cas: 68515-25-3
Name: ALKYL BENZENES, C-10 TO C-12; (ALKYBENZENES)
% Wt: 7
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

RTECS #: 9999999VO
Name: VOLATILE ORGANIC CONTENT 6.55 LBS/GAL (789 GR/L)
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Name: SUP DAT: OF LIQUID INTO LUNGS. GET MD ATTN. PHYSICIAN NOTE: IF MORE THAN 2.0 ML/KG HAS BEEN INGESTED & VOMIT HAS

Name: ING 4: NOT OCCURRED, EMESIS SHOULD BE INDUCED W/SUPERVISION. KEEP VICTIM'S HEAD BELOW HIPS TO PREVENT ASPIR. IF

Name: ING 5: SYMP SUCH AS LOSS OF GAG REFLEXES, CONVULSIONS/UNCON OCCUR BEFORE EMESIS, GASTRIC LAVAGE USING CUFFED

Name: ING 6: ENDOTRACHEAL TUBE SHOULD BE CONSIDERED.

Name: SPILL PROC: WATER FOG MAY BE USED TO SUPPRESS. CONTAIN RUN-OFF. REMOVE W/VACUUM TRUCKS/PUMP TO STOR/SALVAGE

Name: ING 8: VESSEL. SOAK UP RESIDUE W/ABSORB (I.E. VERMICULITE/OTHER SUITABLE MATL). PLACE IN NON-LEAKING CONTRS FOR

Name: ING 9: PROPER DISP. FLUSH AREA W/WATER TO REMOVE TRACE RESIDUE. DISP OF FLUSH SOLUTIONS AS ABOVE. SML SPILLS:

Name: ING 10: SOAK UP W/ABSORB MATL & PLACE IN NON-LEAKING CONTRS. SEAL TIGHTLY & IDENTIFY CONTR FOR PROPER DISP.

Name: ING 11: ENVIRONMENTAL IMPACT: SPILLS SHOULD BE REPORTED TO NATL RESPONSE CENTER & OTHER AGENCIES AS DICTATED BY REGS.

Name: OTHER PREC: TO SURROUNDING AREAS.
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Health Hazards Data
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LD50 LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.
Route Of Entry Inds - Inhalation: YES
Skin: YES
Ingestion: YES
Carcinogenicity Inds - NTP: NO
IARC: NO
OSHA: NO
Effects of Exposure: EYES: WILL CAUSE IRRIT. MAY CAUSE PAIN, TEARING, & INFLAMM. HIGH VAP CONCS MAY ALSO BE IRRIT. SKIN: MILDLY IRRIT. PRLNG/RPTD CONT CAN RSLT IN DEFAT & DRYING OF SKIN WHICH MAY RSLT IN SKIN IRRIT & DERM . INHAL: VAPS MAY BE IRRIT TO NOSE, THROAT, & RESP TRACT. HIGH VAP CONCS MAY CAUSE CNS DEPRESS. (EFTS OF OVEREXP)
Explanation Of Carcinogenicity: NOT RELEVANT.
Signs And Symptions Of Overexposure: HLTH HAZ: INGEST: MAY RSLT IN VOMIT; ASPIR (BRTHG) OF VOMITUS INTO LUNG SHOULD BE AVOIDED AS EVEN SML QTYS MAY RSLT IN ASPIR PNEUMIT. SIGNS & SYMP: IRRIT AS NOTED ABOVE. EARLY TO MD CNS (CENTRAL NERVS SYS) DEPRESS MAY BE EVIDENCED BY GIDD,HDCH, DIZZ & NAUS. IN EXTREME CASES UNCON & DEATH MAY OCCUR. ASPIR (SUP DAT)
Medical Cond Aggravated By Exposure: PRE-EXISTING EYE, AND RESPIRATORY DISORDERS MAY BE AGGRAVATED BY EXPOSURE TO THIS PRODUCT. INTENTIONAL ABUSE, MISUSE OR MASSIVE EXPOSURE MAY CAUSE MULTIPLE ORGAN DAMAGE AND/OR DEATH.
First Aid: EYES: HOLD EYELIDS OPEN & FLUSH W/PLENTY OF WATER FOR AT LEAST 15 MIN. GET MD ATTN. SKIN: REMOVE CONTAM CLTHG & SHOES. FLUSH SKIN W/WATER. FOLLOW BY WASHING W/SOAP & WATER. IF IRRIT OCCURS, GET MD ATT N. DO NOT REUSE CLTHG UNTIL CLEANED. INHAL: REMOVE VICTIM TO FRESH AIR, IF BRTHG IS DFCLT PROVIDE OXYGEN, IF NOT BRTHG PROVIDE ARTF RESP. GET MD ATTN. INGEST: DO NOT INDUCE VOMIT. IF VOMIT (SUP DAT)
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Handling and Disposal
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Spill Release Procedures: ELIMINATE ALL IGNIT SOURCES. HNDLG EQUIP MUST BE GROUNDED TO PREVENT SPARKING. LGE SPILLS: EVACUATE HAZ AREA OF UNPROT PERS. WEAR APPROP RESP & PROT CLTHG. SHUT OFF SOURCE OF LEAK ONLY IF SAFE TO DO S O. DIKE & CONTAIN. IF VAP CLOUD FORMS,
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Methods: DISPOSE OF IN ACCORDANCE W/LOCAL, STATE & FEDERAL REGULATIONS.
Handling And Storage Precautions: STORE CONTRS IN SAFE NON-TRAFFIC AREA. KEEP CONTR CLOSED & WELL IDENTIFIED. WHEN TRANSFERRING PROD USE BONDING PROC.

WARNING! COMBUSTIBLE!
Other Precautions: DO NOT CUT, DRILL, GRIND, WELD/SIMILAR OPERATIONS ON/NEAR EMPTY CONTRS. KEEP LIQUID & VAPS AWAY FROM HEAT, SPARKS, FLAME/OTHER IGNIT SOURCES. POST NO SMOKING/SIMILAR WARNING SIGNS. VAPS NORM HVR/AIR & CAN BE MOVED BY AIR CURRENTS

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Fire and Explosion Hazard Information

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Flash Point Method: TCC
Flash Point Text: 142F,61C
Lower Limits: 1%
Upper Limits: 6%
Extinguishing Media: WATER FOG, FOAM, DRY CHEM/CO*2. DO NOT USE DIRECT STREAM OF WATER. PROD WILL FLOAT & CAN BE REIGNITED ON SURF OF WATER.
Fire Fighting Procedures: WEAR NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FP N). CLEAR FIRE AREA OF UNPROT PERS. COOL FIRE-EXPOSED CONTAINERS.
Unusual Fire/Explosion Hazard: CONTRS EXPOSED TO INTENSE HEAT FROM FIRES SHOULD BE COOLED W/WATER TO PREVENT VAP PRESS BUILDUP WHICH COULD RSLT IN CONTR RUPTURE. CONTR AREA EXPOSED (SUP DAT)

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Control Measures

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Respiratory Protection: AVOID PRLNG/RPTD BRTHG OF VAPS. USE NIOSH/MSHA APPRVD RESP TO AVOID OVEREXPOS, WHEN ANTICIPATED EXPOSURE EXCEEDS OCCUPATIONAL EXPOSURE LIMITS. USE EITHER ATMOSPHERE-SUPP RESP/AIR-PURIFYING RESP FOR OR G VAPS.
Ventilation: USE EXPLOSION-PROOF VENTILATION AS REQUIRED TO CONTROL VAPOR CONCENTRATIONS.
Protective Gloves: CHEMICAL-RESISTANT GLOVES.
Eye Protection: ANSI APPRVD CHEM WORKERS GOGGS (FP N).
Other Protective Equipment: WEAR APPROPRIATE CLOTHING TO MINIMIZE CONTACT. EMERGENCY EYEWASH & DELUGE SHOWER MEETING ANSI DESIGN CRITERIA (FP N).
Work Hygienic Practices: AIR-DRY CONTAMINATED CLOTHING IN A WELL-VENTILATED AREA. LAUNDER BEFORE REUSE.
Supplemental Safety and Health: EXPLO HAZ: TO DIRECT FLAME CONT SHOULD BE COOLED W/LGE QTYS OF WATER AS NEEDED TO PREVENT WEAKENING OF CONTR. EFTS OF OVEREXP: PNEUMIT MAY BE EVIDENCED BY COUGHING, LABORED BRTHG & CYANOSIS (BLUISH SK IN). IN SEV CASES DEATH MAY OCCUR. FIRST AID PROC: OCCURS SPONTANEOUSLY, KEEP HEAD BELOW HIPS TO PREVENT ASPIR

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Physical/Chemical Properties

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B.P. Text: >371F,>188C
Vapor Pres: 0.75 @ 20C
Vapor Density: 5.8
Spec Gravity: 0.79
Evaporation Rate & Reference: 0.04 (BUTYL ACETATE = 1)
Solubility in Water: NEGLIGIBLE
Appearance and Odor: WATER-WHITE WITH PAINT THINNER ODOR

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Reactivity Data

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Stability Indicator: YES
Stability Condition To Avoid: AVOID HEAT, SPARKS, FLAME.
Materials To Avoid: AVOID CONTACT WITH STRONG OXIDIZING AGENTS.
Hazardous Decomposition Products: CARBON MONOXIDE AND UNIDENTIFIED ORGANIC COMPOUNDS MAY BE FORMED DURING COMBUSTION.
Hazardous Polymerization Indicator: NO
Conditions To Avoid Polymerization: NOT RELEVANT.

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Toxicological Information
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Ecological Information
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MSDS Transport Information
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Regulatory Information
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Other Information
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Transportation Information
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Responsible Party Cage: 1194X
Trans ID NO: 87046
Product ID: PD 680 TYPE II, 101302
MSDS Prepared Date: 09/16/1993
Review Date: 09/14/1995
MFN: 1
Multiple KIT Number: 0
Review IND: Y
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Detail DOT Information
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DOT PSN Code: XXX
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Detail IMO Information
==========
IMO PSN Code: XXX
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Detail IATA Information
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IATA PSN CP
IATA UN ID Num: 1992
IATA Proper Shipping Name: FLAMMABLE LIQUID, TOXIC, N.O.S. *
IATA UN Class: 3
Subsidiary Risk Class: 6.1
IATA Label: FLAMMABLE LIQUID & TOXIC
UN Packing Group: III
Packing Note Passenger: 309
Max Quant Pass: 60L
Max Quant Cargo: 220L
Packaging Note Cargo: 310
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Detail AFI Information
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AFI PSN CP
AFI Symbols: *
AFI Proper Shipping Name: FLAMMABLE LIQUIDS, POISONOUS, N.O.S.
AFI Hazard Class: 3
AFI UN ID NUM: UN1992
AFI Packing Group: III
AFI Label: 6.1
Special Provisions: P5
Back Pack Reference: A7.3

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HAZCOM Label
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Product ID: PD 680 TYPE II, 101302
Cage: 1194X
Company Name: CROWN CHEMICAL CORP
Street: 1888 NIRVANA AVE
City: CHULA VISTA CA
Zipcode: 92011-6118
Health Emergency Phone: 800-424-9300 (CHEMTREC)
Label Required IND: Y
Date Of Label Review: 03/27/1995
Status Code: C
Label Date: 03/27/1995
Origination Code: G
Eye Protection IND: YES
Skin Protection IND: YES
Signal Word: WARNING
Respiratory Protection IND: YES
Health Hazard: Moderate
Contact Hazard: Moderate
Fire Hazard: Moderate
Reactivity Hazard: None
Hazard And Precautions: COMBUSTIBLE. ACUTE: EYES: IRRITATION WITH PAIN, TEARING AND INFLAMMATION. MAY IRRITATE SKIN CAUSING DERMATITIS. VAPORS MAY IRRITATE NOSE, THROAT AND RESPIRATORY TRACT. MAY CAUSE CENTRAL NERVOUS SYSTEM DEPRESSION. SYMPTOMS: GIDDINESS, HEADACHE, DIZZINESS AND NAUSEA. ASPIRATION HAZARD, MAY CAUSE CHEMICAL PNEUMONITIS. MAY CAUSE UNCONSCIOUSNESS AND DEATH. CHRONIC: NONE SPECIFIED BY MANUFACTURER.
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----------Record 1 ----------
NSN:
LSN: 2540-00F007472
RESPONSIBLE PARTY CAGE: F0279
PRODUCT ID: SULFURIC ACID-BATTERY ELECTROLYTE
MFN: 01
MSDS DATE: 01/01/1987
SUBMITTER SERVICE: F
SUBMITTER ACTIVITY: BT
TECH REVIEW: 01/01/1987
STATUS CD: C
REVIEW IND: Y
PROPRIETARY IND: N
EDI: N
SPECIAL PROJECT CD: N
PUBLISHED: Y
FSC: 2540
NIIN:
LIIN: 00F007472
MSDS SERIAL NUM: BBYBN
ARTICLE: N
KIT PART: N
ARCHIVE IND: Y
RESP PARTY COMPANY NAME: C & D POWER SYSTEMS/PLYMOUTH MEETING, PA 19462
RESP PARTY STREET ADDRESS:
RESP PARTY P.O. BOX:
RESP PARTY CITY: N/P
RESP PARTY STATE: NK
RESP PARTY ZIP CODE: 00000
RESP PARTY COUNTRY: NK
RESP PARTY INFO PHONE NO:
RESP PARTY EMERGENCY PHONE: (215) 828-9000
RESP PARTY OTHER MSDS NUMBER:
PREPARER'S NAME: N/P
CHEMTREC IND/PHONE:
CONTRACTOR CAGE: F0279
CONTRACTOR ASSIGNED IND: Y
CONTRACTOR COMPANY NAME: C & D POWER SYSTEMS/PLYMOUTH MEETING, PA 19462
CONTRACTOR STREET ADDRESS: UNKNOWN
CONTRACTOR P.O. BOX: 3053
CONTRACT CITY: UNKNOWN
CONTRACTOR STATE: NK
CONTRACTOR ZIP CODE: 00000
CONTRACTOR COUNTRY: NK
CONTRACTOR PHONE: UNKNOWN
CONTRACT NUMBER:
CONTRACTOR CAGE: 1K126
CONTRACTOR ASSIGNED IND: N
CONTRACTOR COMPANY NAME: C AND D POWER SYSTEMS AN ALLIED CO
CONTRACTOR STREET ADDRESS: 3043 WALTON RD
CONTRACTOR P.O. BOX:
CONTRACT CITY: PLYMOUTH MEETING
CONTRACTOR STATE: PA
CONTRACTOR ZIP CODE: 19462
CONTRACTOR COUNTRY: US
CONTRACTOR PHONE: 215-828-9000
CONTRACT NUMBER:
CAS: 7664-93-9
CAS CODE: M
RTECS NUMBER: WS5600000
RTECS CODE: M

INGREDIENT NAME: SULFURIC ACID (SARA III)
% TEXT: 28%
ENVIRONMENTAL WEIGHT %:
OSHA PEL: 1 MG/M3
OSHA PEL CODE: M
OTHER REC LIMITS: N/P
OSHA STEL:
OSHA STEL CODE:
ACGIH TLV: 1 MG/M3; 9192
ACGIH TLV CODE: M
ACGIH STEL: N/P
ACGIH STEL CODE:
EPA RPT QTY: 1000 LBS
DOT RPT QTY: 1000 LBS
OZONE DEPLETING CHEMICAL: N
LD50 LC50 MIXTURE: N/P
ROUTE OF ENTRY INDS-INHALATION: N/P
ROUTE OF ENTRY INDS-SKIN: N/P
ROUTE OF ENTRY INDS-INGESTION: N/P
HEALTH HAZ ACUTE AND CHRONIC: N/P
CARCINOGENICITY INDS - NTP: N/P
CARCINOGENICITY INDS - IARC: N/P
CARCINOGENICITY INDS - OSHA: N/P
EXPLANATION CARCINOGENICITY: N/P
SIGNS/SYMPTOMS OVEREXPOSURE: IRRITATION OF UPPER RESP. SYSTEM, LUNG PULMONARY EDEMA/BURNS TO MOUTH/THROAT/STOMACH.
MED COND AGGRAVATED BY EXP: N/P
FIRST AID: SKIN/EYES: FLUSH W/WATER FOR AT LEAST 15 MINS. REMOVE CONTAMINATED CLOTHING. INGESTION: DON'T INDUCE VOMITING. DRINK LARGE AMTS OF WATER/MILK. INHALATION: REMOVE TO FRESH AIR. GIVE CPR IF BREATHING HAS STOPPED. IF BREATHING IS DIFFICULT, OXYGEN.
SPILL RELEASE PROCEDURES: NEUTRALIZE SPILL W/ALKALI MATERIAL SUCH AS SODA ASH OR LIME. ADEQUATE VENT. IS REQUID FOR SODA ASH DUE TO RELEASE OF C02 GAS. FOR MAJOR SPILLS, KEEP UNPROTEED PERSONS SHOULD CONTAIN THE ACID BY DIKING W/CLAY OR SOIL.
NEUTRALIZING AGENT: N/P
WASTE DISPOSAL METHODS: ANY RELEASE TO THE ENVIRONMENT MAY BE SUBJECT TO STATE, AND/OR FEDERAL REPORTING REQUIREMENTS. THE RESULTING SULFATE SALTS MAY BE DILUTED, LANDFILL, OR WASHED TO SEWER IF LOCAL ORDINANCES PERMITS.
HANDLING/STORAGE PRECAUTIONS: STORE IN COOL, WELL VENT. AREA AWAY FROM COMBUSTIBLES/REACTIVE MATERIALS. KEEP SOURCES OF IGNION AWAY.
OTHER PRECAUTIONS: KEEP SOURCES OF IGNITION AWAY. PREVENT SMOKING IN AREA DUE TO POSSIBLE ELEVATED HYDROGEN LEVELS. DON'T WEAR CONTACT LENSES.
FLASH PT METHOD: N/P
FLASH PT:
FLASH POINT TEXT: N/R
AUTOIGNITION TEMP:
AUTOIGNITION TEMP TEXT: N/A
LOWER LIMITS: N/R
UPPER LIMITS: N/R
EXTINGUISHING MEDIA: USE DRY CHEMICALS, CO2 OR WATER FOG.
FIRE FIGHTING PROCEDURES: SCBA & FULL PROTECTIVE CLOTHING.
UNUSUAL FIRE/EXPLOSION HAZARD: WATER ADDED TO DILUTE SULFURIC ACID MAY RESULT IN CONSIDERABLE HEAT GENERATION. HYDROGEN GAS.
RESPIRATORY PROTECTION: NIOSH APPROVED FO SULFURIC MIST AS APPLICABLE.
VENTILATION: SUFFICIENT TO REDUCE VAPOR/ACID MIST TO PERMISSIBLE LELS
PROTECTIVE GLOVES: RUBBER/NEOPRENE
EYE PROTECTION: SAFETY GOGGLES/FACE SHIEL
OTHER PROTECTIVE EQUIPMENT: ACID RESISTANT APRON/PROTECTIVE CLOTHING/EYEWASH/SHOWER.
WORK HYGENIC PRACTICES: N/P

SUPPLEMENTAL SAFETY & HEALTH: MSDS DATE: 10/20/85.
HCC:
NRC/STATE LIC NO:
NET PROP WT FOR AMMO:
BOILING POINT:
B.P. TEXT: N/R
MELT/FREEZE PT:
M.P/F.P TEXT: N/A
DECOMP TEMP:
DECOMP TEXT: N/A
VAPOR PRES: N/R
VAPOR DENSITY: N/R
SPEC GRAVITY: 1.25
VOLATILE ORG CONTENT %:
VOC GRAMS/LITER:
VOC POUNDS/GALLON:
PH: N/P
VISCOSITY: N/P
EVAPORATION RATE & REFERENCE: N/R
SOLUBILITY IN WATER: COMPLETE
APPEARANCE AND ODOR: CLEAR, ODORLESS.
PERCENT VOLATILES BY VOLUME: N/R
CORROSION RATE: N/P
STABILITY INDICATOR: YES
STABILITY CONDITIONS TO AVOID: N//K
MATERIALS TO AVOID:
CONTACT W/METAL POWDERS MAY RELEASE HYDROGEN.
HAZARDOUS DECOMPOSITION PRODUCTS POTENTIALLY EXPLOSIVE HYDROGEN GAS CAN BE GENERATED INSIDE.
HAZARDOUS POLYMERIZATION INDICAT NO
CONDITIONS TO AVOID POLYMERIZATI N/K
TOXICOLOGICAL INFORMATION: N/P
ECOLOGICAL INFORMATION: N/P
TRANSPORT INFORMATION: N/P
SARA TITLE III: N/P
FEDERAL REGULATORY: N/P
STATE REGULATORY INFORMATION: N/P
OTHER INFORMATION: N/P
LABEL PRODUCT ID: SULFURIC ACID-BATTERY ELECTROLYTE
LABEL CAGE: F0279
ASSIGNED IND: Y
LABEL COMPANY NAME: C & D POWER SYSTEMS/PLYMOUTH MEETING, PA 19462
LABEL STREET: UNKNOWN
LABEL P.O. BOX: 3053
LABEL CITY: UNKNOWN
LABEL STATE: NK
LABEL ZIP CODE: 00000
LABEL COUNTRY: NK
HEALTH EMERGENCY PHONE NUM: (215) 828-9000
LABEL REQUIRED IND: Y
DATE OF LABEL REVIEW: 12/16/1998
STATUS CODE: C
MFG LABEL NO:
LABEL DATE: 12/16/1998
YEAR PROCURED: N/K
ORIGINATION CODE: G
CHRONIC HAZARD IND: N/P
EYE PROTECTION IND: N/P
SKIN PROTECTION IND: N/P
RESPIRATORY PROTECTION IND: N/P
SIGNAL WORD: N/P

HEALTH HAZARD:
CONTACT HAZARD:
FIRE HAZARD:
REACTIVITY HAZARD:
HAZARD AND PRECAUTIONS: IRRITATION OF UPPER RESP. SYSTEM, LUNG PULMONARY EDEMA/BURNS TO MOUTH/THROAT/STOMACH.

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

TOLUENE

MSDS Number: T3913 — *Effective Date: 11/02/01*

1. Product Identification

Synonyms: Methylbenzene; Toluol; Phenylmethane
CAS No.: 108-88-3
Molecular Weight: 92.14
Chemical Formula: C6H5-CH3
Product Codes: J.T. Baker: 5375, 5584, 5809, 5812, 9336, 9351, 9364, 9456, 9457, 9459, 9460, 9462, 9466, 9472, 9476
Mallinckrodt: 4483, 8091, 8092, 8604, 8608, 8610, 8611, V560

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Toluene	108-88-3	100%	Yes

3. Hazards Identification

Emergency Overview

POISON! DANGER! HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. VAPOR HARMFUL. FLAMMABLE LIQUID AND VAPOR. MAY AFFECT LIVER, KIDNEYS, BLOOD SYSTEM, OR

CENTRAL NERVOUS SYSTEM. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate
Flammability Rating: 3 - Severe (Flammable)
Reactivity Rating: 0 - None
Contact Rating: 1 - Slight
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Inhalation may cause irritation of the upper respiratory tract. Symptoms of overexposure may include fatigue, confusion, headache, dizziness and drowsiness. Peculiar skin sensations (e. g. pins and needles) or numbness may be produced. Very high concentrations may cause unconsciousness and death.
Ingestion:
Swallowing may cause abdominal spasms and other symptoms that parallel over-exposure from inhalation. Aspiration of material into the lungs can cause chemical pneumonitis, which may be fatal.
Skin Contact:
Causes irritation. May be absorbed through skin.
Eye Contact:
Causes severe eye irritation with redness and pain.
Chronic Exposure:
Reports of chronic poisoning describe anemia, decreased blood cell count and bone marrow hypoplasia. Liver and kidney damage may occur. Repeated or prolonged contact has a defatting action, causing drying, redness, dermatitis. Exposure to toluene may affect the developing fetus.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or impaired liver or kidney function may be more susceptible to the effects of this substance. Alcoholic beverage consumption can enhance the toxic effects of this substance.

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4. First Aid Measures

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. CALL A PHYSICIAN IMMEDIATELY.
Ingestion:
Aspiration hazard. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention

immediately. If vomiting occurs, keep head below hips to prevent aspiration into lungs.
Skin Contact:
In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Call a physician immediately.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

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5. Fire Fighting Measures

Fire:
Flash point: 7C (45F) CC
Autoignition temperature: 422C (792F)
Flammable limits in air % by volume:
lel: 3.3; uel: 19
Flammable liquid and vapor!
Dangerous fire hazard when exposed to heat or flame. Vapors can flow along surfaces to distant ignition source and flash back.
Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Contact with strong oxidizers may cause fire or explosion. Sensitive to static discharge.
Fire Extinguishing Media:
Dry chemical, foam or carbon dioxide. Water may be used to flush spills away from exposures and to dilute spills to non-flammable mixtures.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Water spray may be used to keep fire exposed containers cool.

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6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

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7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

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8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
Toluene:
- OSHA Permissible Exposure Limit (PEL):
200 ppm (TWA); 300 ppm (acceptable ceiling conc.); 500 ppm (maximum conc.).
- ACGIH Threshold Limit Value (TLV):
50 ppm (TWA) skin, A4 - Not Classifiable as a Human Carcinogen.

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a half-face organic vapor respirator may be worn for up to ten times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

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9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.

Odor:
Aromatic benzene-like.
Solubility:
0.05 gm/100gm water @ 20C (68F).
Specific Gravity:
0.86 @ 20C / 4 C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
111C (232F)
Melting Point:
-95C (-139F)
Vapor Density (Air=1):
3.14
Vapor Pressure (mm Hg):
22 @ 20C (68F)
Evaporation Rate (BuAc=1):
2.24

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10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Containers may burst when heated.
Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Heat, flame, strong oxidizers, nitric and sulfuric acids, chlorine, nitrogen tetraoxide; will attack some forms of plastics, rubber, coatings.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

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11. Toxicological Information

Toxicological Data:
Oral rat LD50: 636 mg/kg; skin rabbit LD50: 14100 uL/kg; inhalation rat LC50: 49 gm/m3/4H; Irritation data: skin rabbit, 500 mg, Moderate; eye rabbit, 2 mg/24H, Severe. Investigated as a tumorigen, mutagen, reproductive effector.
Reproductive Toxicity:
Has shown some evidence of reproductive effects in laboratory animals.

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--------\Cancer Lists\-----------------------------------------------------
                                        ---NTP Carcinogen---
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Ingredient	Known	Anticipated	IARC Category
Toluene (108-88-3)	No	No	3

12. Ecological Information

Environmental Fate:
When released into the soil, this material may evaporate to a moderate extent. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material may biodegrade to a moderate extent. When released into water, this material may evaporate to a moderate extent. When released into water, this material may biodegrade to a moderate extent. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life of less than 1 day. This material is not expected to significantly bioaccumulate. This material has a log octanol-water partition coefficient of less than 3.0. Bioconcentration factor = 13.2 (eels).
Environmental Toxicity:
This material is expected to be toxic to aquatic life. The LC50/96-hour values for fish are between 10 and 100 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: TOLUENE
Hazard Class: 3
UN/NA: UN1294
Packing Group: II
Information reported for product/size: 390LB

International (Water, I.M.O.)

Proper Shipping Name: TOLUENE
Hazard Class: 3
UN/NA: UN1294

Packing Group: II
Information reported for product/size: 390LB

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\----------

Ingredient	TSCA	EC	Japan	Australia
Toluene (108-88-3)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\----------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Toluene (108-88-3)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Toluene (108-88-3)	No	No	Yes	No

--------\Federal, State & International Regulations - Part 2\----------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Toluene (108-88-3)	1000	U220	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: Yes
SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
Reactivity: No (Pure / Liquid)

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

Australian Hazchem Code: 3[Y]E
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **2** Flammability: **3** Reactivity: **0**
Label Hazard Warning:
POISON! DANGER! HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. VAPOR HARMFUL. FLAMMABLE LIQUID AND VAPOR. MAY AFFECT LIVER, KIDNEYS, BLOOD SYSTEM, OR

CENTRAL NERVOUS SYSTEM. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

Label Precautions:

Keep away from heat, sparks and flame.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Avoid breathing vapor.
Avoid contact with eyes, skin and clothing.

Label First Aid:

Aspiration hazard. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If vomiting occurs, keep head below hips to prevent aspiration into lungs. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician immediately.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 8.

Disclaimer:

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****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

1,1,1-TRICHLOROETHANE

MSDS Number: T4914 --- *Effective Date: 09/14/00*

1. Product Identification

Synonyms: Methyl chloroform; trichloroethane; chloroetene
CAS No.: 71-55-6
Molecular Weight: 133.40
Chemical Formula: CH3CCl3
Product Codes: 5381, 9435, 9437, W509, W510

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Methyl Chloroform	71-55-6	96 - 100%	Yes
Dioxane	123-91-1	< 3%	Yes
1,2-Epoxybutane	106-88-7	< 0.5%	Yes
Actual concentrations proprietary			

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER, KIDNEYS, AND CARDIOVASCULAR SYSTEM. CAUSES IRRITATION TO SKIN, EYES

AND RESPIRATORY TRACT. POSSIBLE CANCER HAZARD. CONTAINS DIOXANE WHICH MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Cancer Causing)
Flammability Rating: 1 - Slight
Reactivity Rating: 1 - Slight
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES
Storage Color Code: Blue (Health)

Potential Health Effects

Inhalation:
Inhalation of vapors will irritate the respiratory tract. Affects the central nervous system. Symptoms include headache, dizziness, weakness, nausea. Higher levels of exposure (> 5000 ppm) can cause irregular heart beat, kidney and liver damage, fall in blood pressure, unconsciousness and even death.
Ingestion:
Harmful if swallowed. Symptoms similar to inhalation will occur along with nausea, vomiting. Aspiration of material into the lungs can cause chemical pneumonitis which can be fatal. If aspirated, may be rapidly absorbed through the lungs and result in injury to other body systems.
Skin Contact:
Causes mild irritation and redness, especially on prolonged contact. Repeated contact may cause drying or flaking of the skin.
Eye Contact:
Liquids and vapors cause irritation. Symptoms include tearing, redness, stinging, swelling.
Chronic Exposure:
Prolonged or repeated skin contact may cause dermatitis. Chronic exposure may affect the kidneys and liver. Dioxane is a suspected human carcinogen based on animal data.
Aggravation of Pre-existing Conditions:
Personnel with CNS, kidney, liver or heart disease may be more susceptible to the effects of this substance. Use of alcoholic beverages may aggravate symptoms.

---

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.
Ingestion:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:

In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Call a physician.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

---

5. Fire Fighting Measures

Fire:

Autoignition temperature: 500C (932F)
Flammable limits in air % by volume:
lel: 7.0; uel: 16.0
Vapors in containers can explode if subjected to high energy source.
Dioxane has a flash point below 16C (60F).

Explosion:

Can react with strong caustic, such as potash to form a flammable or explosive material. Air/vapor mixtures may explode when heated. Vapors can flow along surfaces to distant ignition source and flash back. Sealed containers may rupture when heated.

Fire Extinguishing Media:

Use any means suitable for extinguishing surrounding fire.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Combustion by-products include phosgene and hydrogen chloride gases. Structural firefighters' clothing provides only limited protection to the combustion products of this material.

---

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! Do not use aluminum, magnesium or zinc metal for storage container. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

---

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against

physical damage. Isolate from any source of heat or ignition. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product. Do not use aluminum equipment or storage containers. Contact with aluminum parts in a pressurized fluid system may cause violent reactions.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
350 ppm (TWA) for trichloroethane
100 ppm (TWA) skin for dioxane
-ACGIH Threshold Limit Value (TLV):
350 ppm (TWA), 450 ppm (STEL) for trichloroethane
20 ppm (TWA) skin, A3 - Animal Carcinogen for dioxane
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Breathing air quality must meet the requirements of the OSHA respiratory protection standard (29CFR1910.134). This substance has questionable warning properties. Where respirators are required, you must have a written program covering the basic requirements in the OSHA respirator standard. These include training, fit testing, medical approval, cleaning, maintenance, cartridge change schedules, etc. See 29CFR1910.134 for details.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Viton is a recommended material for personal protective equipment.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Mild chloroform-like odor.
Solubility:
4,400 ppm in water @ 20C (68F)

Specific Gravity:
1.34 @ 20C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
74C (165F)
Melting Point:
-32C (-26F)
Vapor Density (Air=1):
4.63
Vapor Pressure (mm Hg):
100 @ 20C (68F)
Evaporation Rate (BuAc=1):
12.8

---

10. Stability and Reactivity

Stability:
Requires inhibitor content to prevent corrosion of metals. Slowly hydrolyzes in water to form hydrochloric and acetic acid.
Hazardous Decomposition Products:
May produce carbon monoxide, carbon dioxide, hydrogen chloride and phosgene when heated to decomposition. Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
Hazardous polymerization can occur in contact with aluminum trichloride.
Incompatibilities:
Open flames, welding arcs, nitrogen tetroxide, oxygen, liquid oxygen, sodium, sodium hydroxide, and sodium-potassium alloy, strong alkalis, oxidizers, aluminum and other reactive metals.
Conditions to Avoid:
Insufficient inhibitor, incompatibles, heat, flame and ignition sources

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11. Toxicological Information

Oral rat LD50: 9600 mg/kg; inhalation rat LC50: 18000 ppm/4H; investigated as a mutagen, tumorigen, reproductive effector; irritation eye rabbit, Standard Draize, 2mg/24H severe.

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--------\Cancer Lists\-------------------------------------------------------
                                        ---NTP Carcinogen---
Ingredient                              Known    Anticipated    IARC Category
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Methyl Chloroform (71-55-6)	No	No	3
Dioxane (123-91-1)	No	Yes	2B
1,2-Epoxybutane (106-88-7)	No	No	2B

12. Ecological Information

Environmental Fate:
When released into the soil, this material is not expected to biodegrade. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released to water, this material is expected to quickly evaporate. This material is not expected to significantly bioaccumulate. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition. When released to the atmosphere, this material has an average global half-life of 6.0 - 6.9 years. When released into the air, this material may adversely affect the ozone layer.
Environmental Toxicity:
This material is expected to be slightly toxic to aquatic life. The LC50/96-hour values for fish are between 10 and 100 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: 1,1,1-TRICHLOROETHANE
Hazard Class: 6.1
UN/NA: UN2831
Packing Group: III
Information reported for product/size: 20L

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\----------

Ingredient	TSCA	EC	Japan	Australia
Methyl Chloroform (71-55-6)	Yes	Yes	Yes	Yes
Dioxane (123-91-1)	Yes	Yes	Yes	Yes
1,2-Epoxybutane (106-88-7)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\----------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Methyl Chloroform (71-55-6)	Yes	Yes	No	Yes
Dioxane (123-91-1)	Yes	Yes	No	Yes
1,2-Epoxybutane (106-88-7)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Methyl Chloroform (71-55-6)	No	No	Yes	No
Dioxane (123-91-1)	No	No	Yes	No
1,2-Epoxybutane (106-88-7)	No	No	Yes	No

--------\Federal, State & International Regulations - Part 2\----------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Methyl Chloroform (71-55-6)	1000	U226	No
Dioxane (123-91-1)	100	U108	No
1,2-Epoxybutane (106-88-7)	100	No	No

Chemical Weapons Convention: No TSCA 12(b): Yes CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Mixture / Liquid)

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: 2[Z]
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **2** Flammability: **1** Reactivity: **0**
Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER, KIDNEYS, AND CARDIOVASCULAR SYSTEM. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. POSSIBLE CANCER HAZARD. CONTAINS DIOXANE

WHICH MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure.

Label Precautions:

Avoid breathing vapor.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Avoid contact with eyes, skin and clothing.

Label First Aid:

If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 8, 11.

Disclaimer:

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Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

****

Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

TRICHLOROETHYLENE

MSDS Number: T4940 --- *Effective Date: 09/14/00*

1. Product Identification

Synonyms: Trichloroethene; TCE; acetylene trichloride; Ethinyl trichloride
CAS No.: 79-01-6
Molecular Weight: 131.39
Chemical Formula: C2HCl3
Product Codes:
J.T. Baker: 5376, 9454, 9458, 9464, 9473, 9474
Mallinckrodt: 8598, 8600, 8633

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Trichloroethylene	79-01-6	100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED OR INHALED. AFFECTS HEART, CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. CAUSES SEVERE SKIN IRRITATION. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT.

SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Cancer Causing)
Flammability Rating: 1 - Slight
Reactivity Rating: 1 - Slight
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: Blue (Health)

Potential Health Effects

Inhalation:
Vapors can irritate the respiratory tract. Causes depression of the central nervous system with symptoms of visual disturbances and mental confusion, incoordination, headache, nausea, euphoria, and dizziness. Inhalation of high concentrations could cause unconsciousness, heart effects, liver effects, kidney effects, and death.
Ingestion:
Cases irritation to gastrointestinal tract. May also cause effects similar to inhalation. May cause coughing, abdominal pain, diarrhea, dizziness, pulmonary edema, unconsciousness. Kidney failure can result in severe cases. Estimated fatal dose is 3-5 ml/kg.
Skin Contact:
Cause irritation, redness and pain. Can cause blistering. Continued skin contact has a defatting action and can produce rough, dry, red skin resulting in secondary infection.
Eye Contact:
Vapors may cause severe irritation with redness and pain. Splashes may cause eye damage.
Chronic Exposure:
Chronic exposures may cause liver, kidney, central nervous system, and peripheral nervous system effects. Workers chronically exposed may exhibit central nervous system depression, intolerance to alcohol, and increased cardiac output. This material is linked to mutagenic effects in humans. This material is also a suspect carcinogen.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders, cardiovascular disorders, impaired liver or kidney or respiratory function, or central or peripheral nervous system disorders may be more susceptible to the effects of the substance.

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4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.
Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by

mouth to an unconscious person. Call a physician.
Skin Contact:
Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Note to Physician:
Do not administer adrenaline or epinephrine to a victim of chlorinated solvent poisoning.

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5. Fire Fighting Measures

Fire:
Autoignition temperature: 420C (788F)
Flammable limits in air % by volume:
lel: 8; uel: 12.5
Explosion:
A strong ignition source, e. g., a welding torch, can produce ignition. Sealed containers may rupture when heated.
Fire Extinguishing Media:
Use water spray to keep fire exposed containers cool. If substance does ignite, use CO_2, dry chemical or foam.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Combustion by-products include phosgene and hydrogen chloride gases. Structural firefighters' clothing provides only limited protection to the combustion products of this material.

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6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

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7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from any source of heat or ignition. Isolate from incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

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8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
Trichloroethylene:
-OSHA Permissible Exposure Limit (PEL):
100 ppm (TWA), 200 ppm (Ceiling),
300 ppm/5min/2hr (Max)

-ACGIH Threshold Limit Value (TLV):
50 ppm (TWA) 100 ppm (STEL);
listed as A5, not suspected as a human carcinogen.
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Breathing air quality must meet the requirements of the OSHA respiratory protection standard (29CFR1910.134). This substance has poor warning properties. Where respirators are required, you must have a written program covering the basic requirements in the OSHA respirator standard. These include training, fit testing, medical approval, cleaning, maintenance, cartridge change schedules, etc. See 29CFR1910.134 for details.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Neoprene is a recommended material for personal protective equipment.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

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9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.

Odor:
Chloroform-like odor.
Solubility:
Practically insoluble in water. Readily miscible in organic solvents.
Specific Gravity:
1.47 @ 20C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
87C (189F)
Melting Point:
-73C (-99F)
Vapor Density (Air=1):
4.5
Vapor Pressure (mm Hg):
57.8 @ 20C (68F)
Evaporation Rate (BuAc=1):
No information found.

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10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Will slowly decompose to hydrochloric acid when exposed to light and moisture.
Hazardous Decomposition Products:
May produce carbon monoxide, carbon dioxide, hydrogen chloride and phosgene when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Strong caustics and alkalis, strong oxidizers, chemically active metals, such as barium, lithium, sodium, magnesium, titanium and beryllium, liquid oxygen.
Conditions to Avoid:
Heat, flame, ignition sources, light, moisture, incompatibles

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11. Toxicological Information

Toxicological Data:
Trichloroethylene: Oral rat LD50: 5650 mg/kg; investigated as a tumorigen, mutagen, reproductive effector.
Reproductive Toxicity:
This material has been linked to mutagenic effects in humans.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Trichloroethylene (79-01-6)	No	Yes	2A

12. Ecological Information

Environmental Fate:
When released into the soil, this material may leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released to water, this material is expected to quickly evaporate. This material has an experimentally-determined bioconcentration factor (BCF) of less than 100. This material is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life between 1 and 10 days.
Environmental Toxicity:
The LC50/96-hour values for fish are between 10 and 100 mg/l. This material is expected to be slightly toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: TRICHLOROETHYLENE
Hazard Class: 6.1
UN/NA: UN1710
Packing Group: III
Information reported for product/size: 5GL

International (Water, I.M.O.)

Proper Shipping Name: TRICHLOROETHYLENE
Hazard Class: 6.1
UN/NA: UN1710
Packing Group: III

Information reported for product/size: 5GL

International (Air, I.C.A.O.)

Proper Shipping Name: TRICHLOROETHYLENE
Hazard Class: 6.1
UN/NA: UN1710
Packing Group: III
Information reported for product/size: 5GL

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\--------

Ingredient	TSCA	EC	Japan	Australia
Trichloroethylene (79-01-6)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\--------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Trichloroethylene (79-01-6)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\--------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Trichloroethylene (79-01-6)	No	No	Yes	No

--------\Federal, State & International Regulations - Part 2\--------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Trichloroethylene (79-01-6)	100	U228	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Pure / Liquid)

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: No information found.
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **2** Flammability: **1** Reactivity: **0**
Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED OR INHALED. AFFECTS HEART, CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. CAUSES SEVERE SKIN IRRITATION. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe vapor.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Keep away from heat and flame.
Label First Aid:
If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician. Note to physician: Do not administer adrenaline or epinephrine to a victim of chlorinated solvent poisoning.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 8, 11.
Disclaimer:
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Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

OLIN CORP -- CPE810004 UNSYMMETRICAL DIMETHYLHYDRAZINE

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MSDS Safety Information

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FSC: 9135
NIIN: 00-687-4293
MSDS Date: 01/01/1995
MSDS Num: BXNXN
Product ID: CPE810004 UNSYMMETRICAL DIMETHYLHYDRAZINE
MFN: 02
Responsible Party
Cage: 8X135
Name: OLIN CORP
Address: 120 LONG RIDGE RD
Box: 1355
City: STAMFORD CT 06904-1355
Info Phone Number: 203-356-3449
Emergency Phone Number: 203-356-3449
Review Ind: Y
Published: Y

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Preparer Co. when other than Responsible Party Co.

==========

Cage: 8X135
Name: OLIN CORP
Address: 51 CORPORATE WOODS 9393 W 110 ST
City: OVERLAND PARK KS 66210

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Contractor Summary

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Cage: 8X135
Name: OLIN CORP
Address: 51 CORPORATE WOODS 9393 W 110 ST
City: OVERLAND PARK KS 66210
Phone: 800-432-6546
Cage: 99530
Name: OLIN CORPORATION
Address: 501 MERRITT 7
Box: 4500
City: NORWALK CT 06856-4500
Phone: 203-750-3000/800-511-MSDS

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Item Description Information

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Item Manager: FPH
Item Name: PROPELLANT,UNS-DIMETHYLHYDRAZINE
Unit of Issue: LB
UI Container Qty: 1

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Ingredients

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Cas: 57-14-7
RTECS #: MV2450000
Name: 1,1-DIMETHYLHYDRAZINE, UDMH INTENDED CHANGE (IC)
% Wt: 95-99
Other REC Limits: 0.5 PPM
OSHA PEL: 0.5 PPM
ACGIH TLV: 0.5 PPM
EPA Rpt Qty: 10 LBS

DOT Rpt Qty: 10 LBS

Cas: 124-40-3
RTECS #: IP8750000
Name: DIMETHYLAMINE
% Wt: 1-5
Other REC Limits: 10 PPM
OSHA PEL: 10 PPM
ACGIH TLV: 10 PPM
EPA Rpt Qty: 1000 LBS
DOT Rpt Qty: 1000 LBS

Cas: 7732-18-5
RTECS #: ZC0110000
Name: WATER
% Wt: 0.1-1
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Health Hazards Data
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LD50 LC50 Mixture: ORAL LD50 (RAT): 122 MG/KG
Route Of Entry Inds - Inhalation: YES
Skin: YES
Ingestion: YES
Carcinogenicity Inds - NTP: NO
IARC: NO
OSHA: NO
Effects of Exposure: INHALATION: NOSE/THROAT/UPPER RESPIRATORY TRACT/LUNG IRRITATION, PULMONARY EDEMA, LUNG/LIVER/KIDNEY/BLOOD/CNS DAMAGE, HEMOLYSIS OF BLOOD CELLS. SKIN: SEVERE IRRITATION/BURNS/DERMATITIS. EYES: BURNS/PE RMANENT CORNEAL DAMAGE. INGESTION: GI TRACT IRRITATION/BURNS. 1,1-DIMETHYLHYDRAZINE IS CONSIDERED MUTAGENIC/SENSITIZER.
Explanation Of Carcinogenicity: NONE
Signs And Symptions Of Overexposure: IRRITATION, INFLAMMATION, BRONCHITIS, VOMITING, DIARRHEA, NAUSEA, DIZZINESS, CYANOSIS, CONVULSIONS, ALLERGIC REACTION, RASH, SWELLING, REDNESS, DISCHARGE, TEMPORARY BLINDNESS, ABDOMINAL PAIN, BLEEDING , TISSUE ULCERATION.
Medical Cond Aggravated By Exposure: LIVER/KIDNEY/BLOOD/CARDIOVASCULAR DISEASE & ASTHMA.
First Aid: EYES/SKIN: IMMEDIATELY FLUSH W/LARGE AMOUNTS OF WATER FOR 15 MINS. INGESTION: IMMEDIATELY DRINK LARGE AMOUNTS OF WATER. INDUCE VOMITING. DON'T GIVE ANYTHING BY MOUTH IF UNCONSCIOUS/CONVULSIVE. INHALAT ION: REMOVE TO FRESH AIR. GIVE CPR/OXYGEN IF NEEDED. KEEP WARM & QUIET. OBTAIN MEDICAL ATTENTION IN ALL CASES.
==========
Handling and Disposal
==========
Spill Release Procedures: EVACUATE AREA/REMOVE IGNITION SOURCES/STOP SOURCE. AIR: SUPPRESS VAPORS W/WATER FOG. CONTAIN LIQUID FOR TREATMENT/NEUTRALIZATION. WATER: SAFELY DIVERT WATER FLOW AROUND AREA. REMOVE W/VACUUM SYSTEM/PU MPING DEVICE FOR TREATMENT/DISPOSAL. (SEE SUPP)
Neutralizing Agent: 5% CALCIUM HYPOCHLORITE AQUEOUS SOLUTION.
Waste Disposal Methods: AS HAZARDOUS LIQUID WASTE, MUST BE DISPOSED OF IAW/FEDERAL, STATE & LOCAL REGULATIONS IN PERMITTED HAZARDOUS WASTE TREATMENT/STORAGE/DISPOSAL FACILITY BY INCINERATION. CONTAINERIZE & LABEL ALL SPILL M ATERIALS PROPERLY. FLAMMABLE LIQUID UN1163.
Handling And Storage Precautions: STORE IN WELL VENTILATED AREA AWAY FROM IGNITION SOURCES. DON'T STORE >124F, EXPOSE TO DIRECT LIGHT. MAINTAIN INERT ATMOSPHERE OVER SOLUTION ALWAYS.
Other Precautions: DON'T CONTAMINATE. CONTAINERS & HANDLING EQUIPMENT SHOULD BE ELECTRICALLY GROUNDED. RETEST MATERIAL >5 YEARS OLD BEFORE USE.

AVOID CONTACT W/SKIN/EYES/CLOTHING. PACKAGE ONLY IN STAINLESS STEEL/ALUMINU M/TEFLON/POLYETHYLENE.

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Fire and Explosion Hazard Information

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Flash Point Method: COC
Flash Point Text: 5F
Lower Limits: 2
Upper Limits: 95
Extinguishing Media: CO2, DRY CHEMICAL, WATER SPRAY.
Fire Fighting Procedures: USE WATER TO COOL CONTAINERS EXPOSED TO FIRE. WEAR A POSITIVE PRESSURE SELF CONTAINED BREATHING APPARATUS & FULL PROTECTIVE CLOTHING.
Unusual Fire/Explosion Hazard: AUTO-IGNITION TEMP: 482F. ABSORPTION OF 1,1-DIMETHYLHYDRAZINE BY RAGS/COTTON WASTE/SAWDUST/SIMILAR ORGANIC MATERIALS WILL RESULT IN SPONTANEOUS COMBUSTION.

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Control Measures

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Respiratory Protection: WEAR A NIOSH/MSHA APPROVED FULL FACE POSITIVE-PRESSURE SUPPLIED AIR RESPIRATOR IF ANY EXPOSURE OCCURS.
Ventilation: LOCAL EXHAUST TO MAINTAIN LEVELS <TLV.
Protective Gloves: BUTYL RUBBER
Eye Protection: SAFETY GLASSES & FACE SHIELD
Other Protective Equipment: BUTYL RUBBER BOOTS/APRON/PROTECTIVE SUIT, EYE WASH, SAFETY SHOWER.
Work Hygienic Practices: REMOVE/LAUNDER CONTAMINATED CLOTHING BEFORE REUSE. WASH AFTER HANDLING. RINSE LEATHER ARTICLES W/WATER & DISCARD THEM.
Supplemental Safety and Health: PH (5% IN NEUTRAL DISTILLED WATER): 9.5-10.5. INCOMPATIBLES: METAL OXIDES/IRON/COPPER/MANGANESE/MOLYBDENUM/LEAD. SPILLS: LAND: DIKE. DILUE MATERIAL TO <30%/2 1/2 TO 1 WATER TO UDMH. DECONTAMINATE AREA BY DILUTING FURTHER W/WATER TO <5%. TEST FOR NEUTRALIZATION. SCRUB AREA W/STRONG DETERGENT & RINSE W/PLENTY OF WATER.

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Physical/Chemical Properties

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B.P. Text: 146F
M.P/F.P Text: -71F
Decomp Text: 700F
Vapor Pres: 157
Vapor Density: 2.1
Spec Gravity: 0.78
PH: (SUPP)
Solubility in Water: MISCIBLE
Appearance and Odor: CLEAR, COLORLESS LIQUID W/AMMONIA ODOR.
Percent Volatiles by Volume: 100

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Reactivity Data

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Stability Indicator: YES
Stability Condition To Avoid: TEMPS >124F, DIRECT LIGHT, HEAT, SPARKS, OPEN FLAME, STATIC DISCHARGE & OTHER IGNITION SOURCES.
Materials To Avoid: STRONG OXIDIZERS/HYDROGEN PEROXIDE/NITROGEN TETROXIDE/FLUORINE/HALOGEN FLUORIDES/HYPOHALITES/FUMING NITRIC ACID (SUPP)
Hazardous Decomposition Products: CO, NITROGEN OXIDES.
Hazardous Polymerization Indicator: NO

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Toxicological Information

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Ecological Information
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MSDS Transport Information
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Regulatory Information
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Other Information
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HAZCOM Label
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Product ID: CPE810004 UNSYMMETRICAL DIMETHYLHYDRAZINE
Cage: 8X135
Company Name: OLIN CORP
Street: 51 CORPORATE WOODS 9393 W 110 ST
City: OVERLAND PARK KS
Zipcode: 66210
Health Emergency Phone: 203-356-3449
Label Required IND: Y
Date Of Label Review: 12/16/1998
Status Code: C
Label Date: 12/16/1998
Origination Code: G
Hazard And Precautions: INHALATION: NOSE/THROAT/UPPER RESPIRATORY TRACT/LUNG IRRITATION, PULMONARY EDEMA, LUNG/LIVER/KIDNEY/BLOOD/CNS DAMAGE, HEMOLYSIS OF BLOOD CELLS. SKIN: SEVERE IRRITATION/BURNS/DERMATITIS. EYES: BURNS/PE RMANENT CORNEAL DAMAGE. INGESTION: GI TRACT IRRITATION/BURNS. 1,1-DIMETHYLHYDRAZINE IS CONSIDERED MUTAGENIC/SENSITIZER. IRRITATION, INFLAMMATION, BRONCHITIS, VOMITING, DIARRHEA, NAUSEA, DIZZINESS, CYA NOSIS, CONVULSIONS, ALLERGIC REACTION, RASH, SWELLING, REDNESS, DISCHARGE, TEMPORARY BLINDNESS, ABDOMINAL PAIN, BLEEDING, TISSUE ULCERATION.
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8

Apartments & Business Est. Prompt & Courteous Service
BA 9-1777

TRI-COUNTY HAULING
RUBBISH and ASH REMOVAL
1777 CALCON HOOK ROAD
Green Hills Branch Sharon Hill P. O., Pa. 19079 JUNE 3 1974

Container No. 1-6 YARDER

No. of Yards

Name of Company ARMY RESERVE

Location of Pick-up FORD ROAD
BRISTOL PA

Signature John J Capozzi

Apartments & Business Est. Prompt & Courteous Service
SA 8-1777

TRI-COUNTY HAULING
RUBBISH and ASH REMOVAL
1777 CALCON HOOK ROAD
Green Hills Branch Sharon Hill P. O., Pa. 19079 JUNE 11 1974

Container No. 1-6 YARDER

No. of Yards

Name of Company ARMY RESERVE BUILDING

Location of Pick-up FORD ROAD

BRISTOL - PA

Signature Pete Capozzi

WM003538

Apartments & Business Est. Prompt & Courteous Service
SA 9-1777

TRI-COUNTY HAULING
RUBBISH and ASH REMOVAL
1777 CALCON HOOK ROAD
Green Hills Branch Sharon Hill P. O., Pa. 19079 JUNE 14 1974

Container No. 1-6 YARDER

No. of Yards

Name of Company ARMY RESERVE BLDG.

Location of Pick-up FORD ROAD
~~[illegible]~~ BRISTOL. PA

Signature [illegible]

WM003539

ORIGINAL (Red)

Apartments & Business Est. Prompt & Courteous Service
SA 8-1777

TRI-COUNTY HAULING
RUBBISH and ASH REMOVAL
1777 CALCON HOOK ROAD
Green Hills Branch Sharon Hill P. O., Pa. 19079 JUNE 21 1974

Container No. 1-6 YARDER

No. of Yards

Name of Company ARMY RESERVE BUILDING

Location of Pick-up FORD ROAD
BRISTOL - PA

Signature Seer Orlom

ORIGINAL (Red)

Accounts & Business Est. Prompt & Courteous Service
SA 8-1777

TRI-COUNTY HAULING
RUBBISH and ASH REMOVAL
1777 CALCON HOOK ROAD
Green Hills Branch Sharon Hill P. O., Pa. 19079 AUG. 2 1974

Container No. 1-6 YARDER

No. of Yards

Name of Company MAGNUM

Location of Pick-up MAY REFINERY

BRISTOL - PA

Signature Pete Capozzi

WM011924

Apartments & Business Est. Prompt & Courteous Service
SA 8-1777

TRI-COUNTY HAULING

RUBBISH and ASH REMOVAL

1777 CALCON HOOK ROAD

Green Hills Branch Sharon Hill P. O., Pa. 19079 AUG. 15 1974

Container No. 1-6 YARDER

No. of Yards

Name of Company MAGNUM

Location of Pick-up ARMY RESERVE

BRISTOL PA

Signature Douglas Reynolds

WM011925

Apartments & Business Est. Prompt & Courteous Service
SA 9-1777

TRI-COUNTY HAULING

RUBBISH and ASH REMOVAL

1777 CALCON HOOK ROAD

Green Hills Branch Sharon Hill P. O., Pa. 19079 SEPT 16 19 74

Container No. 1-6 YARDEN

No. of Yards

Name of Company MAGNUM

Location of Pick-up ARMY RESERVE CENTER - BRISTOL. PA

Signature M. Haldeman

WM008480

Apartments & Business Est. Prompt & Courteous Service
SA 5-1777

TRI-COUNTY HAULING
RUBBISH and ASH REMOVAL
1777 CALCON HOOK ROAD
Green Hills Branch Sharon Hill P. O., Pa. 19079 SEPT 25 1974

Container No. L-6 TANDER

No. of Yards

Name of Company MAGNUM -

Location of Pick-up ARMY RESERVE
BRISTOL - PA

Signature Pete Capozzi

WM008481

Apartments & Business Est. Prompt & Courteous Service
SA 8-1777

TRI-COUNTY HAULING
RUBBISH and ASH REMOVAL
1777 CALCON HOOK ROAD
Green Hills Branch Sharon Hill P. O., Pa. 19079 Nov. 19 19 74

Container No. _____

No. of Yards 1-6 YDS

Name of Company ARMY RESERVE CENTER

Location of Pick-up _____

Signature Pete Caporozzi

WM002920

Vagnoni 6/74
Army Reserve
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$ [illegible]

Vegnani - Magnum
(Army Corps)
12 cu. yd @ 3.00 =
$36.00

WM011923

Vagroni - Army Lis

6 yds @ 3.00 = 18.00

Magnum Inc Army Reserve
12 yds @ 3.00 = 36.00
221

ORIGINAL (Red)

125.13 +
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7.5 x
3.25 =
24.38 *

ORIGINAL (Red)

9

Management file

ORIGINAL (Red)

HEADQUARTERS
THE UNITED STATES ARMY TRAINING CENTER, INFANTRY
Fort Dix, New Jersey

AHOOC-Z

SUBJECT: Management Improvement Program Report, Third Quarter FY 1956 (Command Program Nr. 2B - Management) (RCS-CSCAM-10(R-2))

TO: Commanding General
First Army
Governors Island
New York 4, New York
ATTN: Comptroller

The following report, covering the period 1 January 1956 through 31 March 1956, is submitted in compliance with Circular Nr. 86, your headquarters, dated 8 December 1954.

1. MANAGEMENT IMPROVEMENT ACTIVITIES.

a. Outstanding Management Improvements:

See Inclosure 1.

b. Management Surveys:

During the third quarter FY 1956, two (2) formal organization and methods surveys, one (1) major study and seven (7) special studies were completed. A copy of report of management survey of the Post Stockade is attached as Inclosure 2. Copies of report of management survey of the Personnel Center and study of small purchase procedures will be forwarded under separate cover in the very near future. A total of seven (7) management surveys and fifty-nine (59) special studies have been conducted to date during this fiscal year. It is extremely doubtful at this time that the established goal of sixteen (16) completed organization and methods surveys will be attained by the end of the fourth quarter FY 1956. The resignation of one O & M Examiner effective 3 February 1956 and the attendance at the Adjutant General's School of another O & M Examiner for six weeks resulted in a thirty per cent (30%) loss in man-hours available to the Management Engineering Division during this quarter. The majority of man-hours available were utilized in analyzing the operations of the 1264th ASU Personnel Center.

c. Work Simplification Program:

See Inclosure 3.

d. Incentive Awards Program:

See Inclosure 4.

OUTSTANDING MANAGEMENT IMPROVEMENT

REPORTED BY: Property Disposal Section - G-4 - Fort Dix, N. J.

IMPROVEMENT: Sealed Bids on an Indefinite Contract.

COMMAND PROGRAM AFFECTED: Command Program Nr. 10 - Supply Distribution and Maintenance.

DATE INSTALLED: January 1956.

BEFORE IMPROVEMENT: Scrap metal and waste oil were being disposed of by sale through sealed bids. This was done upon a large accumulation which normally accrued once a month.

AFTER IMPROVEMENT: Items are sold through sealed bids on an indefinite contract for six months. This new system completely eliminates the expenses of establishing a sale of this type of material every month. Included in this new system is an escalator clause which will vary directly with the changes in market price so that the Army will get the benefit of any changes.

GAINS: By consolidating twenty different sales into four (two sales per year for scrap metal and two for oil), approximately $4,000.00 in processing costs will be saved annually.

Release /

ORIGINAL
(Red)

AR 340-18-14 SS 1 Apr 81 Microfiche

Copy 2

Ch 1, 2, 3, 4, 5, 6, 7, 8, 9, 10,

ARMY REGULATION

AR 340-18-14

ORIGINAL

OFFICE MANAGEMENT

MAINTENANCE AND DISPOSITION OF LOGISTICS FUNCTIONAL FILES

Effective 1 January 1970

RETURN TO ARMY LIBRARY
ROOM 1 A 518 PENTAGON

HEADQUARTERS, DEPARTMENT OF THE ARMY

AUGUST 1969

ARMY REGULATIONS
No. 340-18-14

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *15 September 1978*

OFFICE MANAGEMENT

MAINTENANCE AND DISPOSITION OF LOGISTICS FUNCTIONAL FILES

Effective 1 January 1979

Local supplementation of this regulation is prohibited except upon approval of The Adjutant General.

1. Applicability. *a.* This regulation is applicable to all Department of the Army elements except Active Army TOE units below division level, Army Reserve elements, ROTC elements, Army National Guard units, and TDA units conducting basic combat training or advanced individual training.

b. Offices responsible for logistics functions will use this regulation to identify, maintain, and dispose of records documenting these functions. The identification, maintenance, and disposition of records of this nature maintained by other offices are governed by AR 340-18-1 and/or the Army regulation in the 340-18 series pertaining to the function of that office.

2. Related regulations. AR 340-18-1 contains basic procedures to be used with The Army Functional Files System and the file numbers, descriptions, and retention periods for Office Housekeeping Files. File numbers, descriptions, and retention periods for files relating to major categories of records documenting mission functions are contained in Army Regulations 340-18-2 through 340-18-15 which are distributed only to the organizations performing the functions concerned.

★**3. Scope.** Under The Army Functional Files System, files relating to the major functional category of Logistics have been assigned the basic file number 1400. This regulation contains file numbers, descriptions, and retention periods for files relating to all aspects concerning the furnishing of supplies and equipment to the Army. As such, the files identification herein relate to procurement, standardization, receipt, storage, issue, disposition, maintenance, services, and accountability of all types of supplies and equipment. Common mission files are described in this regulation under file numbers 1401-01 through 1401-08. Other mission files are grouped into 34 subfunctional categories, as follows:

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*This regulation, together with AR 340-18-1, AR 340-18-2, AR 340-18-3, AR 340-18-4, AR 340-18-5, AR 340-18-6, AR 340-18-7, AR 340-18-8, AR 340-18-9, AR 340-18-10, AR 340-18-11, AR 340-18-12, AR 340-18-13, and AR 340-18-15, all dated 14 August 1969 supersedes AR 345-210, 31 October 1962, including all changes.

Subfunctional category file No.	Subfunctional category file title	Page No.
1401	Common mission files	3
1402	Procurement files	5
1403	Individual procurement transaction files	8
1404	Small business program files	12
1405	Labor relations and industrial equal employment opportunity files	13
1406	Production planning and industrial mobilization files	15
1407	Defense materials system files	16
1408	Strategic and critical materials requirement files	17
1409	Manufacturing files	18
1410	Materiel engineering files	20
1411	Value engineering files	21
1412	Materiel standardization files	22
1413	Supply cataloging files	25
1414	Supply control and quantitative materiel requirement files	26
1415	Stock control and requisition files	28
1416	General supply accounting files	30
1417	Self-service supply center files	35
1418	Nonappropriated fund supply files	36
1419	International logistics files	38
1420	Maintenance files	39
1421	Storage files	42
1422	Ammunition supply files	44
1423	Food program files	45
1424	Commissary and clothing sales store files	46
1425	Field ration account files	48
1426	Troop supply files	49
1427	Laundry and drycleaning files	50
1428	Library supply files	51
1429	Motor vehicle supply files	52
1430	Publications supply files	53
1431	Petroleum and solid fuel supply files	54
1432	Port supply files	55
1433	Civil works supply files	56
1434	Supplies disposition files	57
★1435	Energy conservation files	59

1403 INDIVIDUAL PROCUREMENT TRANSACTION FILES

1. These files relate to the administration of individual procurement transactions which include documents relating to the negotiation, commitment and placement of contracts, purchase orders, and comparable instruments.

2. Files required for documentation of individual procurement transactions are listed and identified in the Armed Services Procurement Regulation. Also included, when applicable, are contract termination files, contract renegotiation files, contract appeal files, and other documents as specified by the appropriate command headquarters as essential to completion of the individual transaction files. These files may accumulate in various operating elements of a procurement office. The element responsible for a function which results in creation of a particular file will be designated as the office of record and will be responsible for complete documentation of that function in order that duplicate material maintained by other elements can be destroyed without extensive checking to determine the extent of duplication. Files of each operating element will be transferred to the records holding area or appropriate records center without consolidation with files of other elements relating to the same contract. No consolidation or paper-by-paper screening of files will be accomplished in records holding area or record centers. Files that are known to be pertinent to an unsettled claim, incomplete investigation, or pending litigation will not be destroyed until settlement of the claim or completion of the investigation or litigation. In addition, records relating to contracts involved in appeals handled by a Board of Contract Appeals will be retained for a period of seven years from the date of the decision of the board.

3. The disposition instructions below do not apply to specific types of contracts described in other regulations in the 340-18 series for which differing disposition instructions are prescribed.

File No.	*Description*	*Disposition*
1403-01	**Transactions for $2,500 or less.** Contracts, purchase orders, or comparable instruments for amounts of $2,500 or less.	Office of record: Destroy after 3 years, except that records relating to contracts involved in appeals handled by a Board of Contract Appeals will be destroyed 7 years after date of decision of the board. Incomplete transaction files will be withdrawn from the cutoff block prior to transfer to the records holding area or records center and brought forward for disposition with the next FY files.
1403-02	**Unsuccessful bid files.** Documents relating to unsuccessful bids, proposals, and quotations for contracts of $2,500 or less. Included are unsuccessful bids (including tie bids), unsuccessful proposals and quotations, and related documents. *Note.* Unsuccessful bids filed with contract files will be destroyed with the contract.	Destroy on final payment of related contract or 1 year after date of award of contract, whichever is later.
1403-03	**Transactions for more than $2,500.** Contracts, purchase orders, or comparable instruments for amounts of more than $2,500.	Office of record: Destroy 6 years after final payment, except that records relating to contracts involved in appeals handled by a Board of Contract Appeals will be destroyed 7 years after date of decision of the board.
1403-04	**Open-end contract information files.** Army circulars and related documents reflecting information as to existing open-end contracts for use of contracting officers in procurement of supplies and equipment.	Office responsible for preparation and issue: Destroy 6 years after expiration date.

File No.	Description	Disposition
		Other offices: Destroy when superseded, obsolete, or no longer needed for reference, whichever is first.
1403-05	**Master, open-end and call-type contract files.** Documents relating to master, open-end, indefinite delivery, Federal Supply Schedule, call-type, and similar contracts. Included are contracts, service authorizations, delivery orders, comparable instruments, and related papers. Offices not administering, but procuring under these contracts, will handle individual service authorizations and delivery orders as separate individual procurement transactions.	Offices administering contract: Destroy 6 years after expiration and final payment, except that records relating to contracts involved in appeals handled by a Board of Contract Appeals will be destroyed 7 years after date of decision of the board. Offices procuring under contract: Individual delivery orders, service authorizations, and comparable instruments; as provided for transactions for $2,500 or less, or for transactions for more than $2,500, as applicable.
1403-06	**Contract standard drawing and specification files.** Standardized drawings and specifications that are used in a sufficient number of individual contracts to warrant reproduction and distribution for such use. Reference sets of such standard drawings and specifications are maintained by contracting elements and contract files may consist of reference to the pertinent standard drawing or specification in lieu of actual copies thereof.	Office responsible for preparation and issue: Permanent. Cut off record set annually. Other offices: Destroy when superseded, obsolete or no longer needed for reference, whichever is first.
1403-07	**Nonaction bid invitation files.** Invitations for bids returned by prospective bidders without bid action.	Destroy immediately after bid opening or on receipt of bid if it can be determined that no bid action was taken.
1403-08	**Rejected bid files.** Invitations for bids accumulated as a result of rejecting all bids to an invitation and a new invitation is not issued.	Destroy after 1 year.
1403-09	**Procurement register files.** Registers or sheets used to record and control the assignment of numbers to contracts, purchase orders, leases, or similar instruments. These files are maintained on a fiscal year basis.	Destroy after 6 years.
1403-10	**Procurement directive files.** Documents used in initiating procurement or production action. Included are procurement directives, production orders, purchase authorizations, requisitions (when used as a direct basis for purchase), consolidated bidders lists, written bids, summaries of proposals, abstracts of bids, cost analyses reports, similar documents, and related papers.	Directives canceled prior to award of contract or purchase order: Destroy after 2 years. Other files: Destroy after 6 years. Do not retire.
1403-11	**Procurement action reporting files.** Documents relating to the reporting system designed to provide statistics concerning placement, status, delivery, and settlement of procurement actions. Included are special, quarterly, procurement activity, status, monthly, contract settlement, semiannual, consolidated, and summary reports, and directly related correspondence. All the above reports, except consolidated reports and summaries, will be filed and disposed of with the related contracts.	Consolidated reports and summaries: Destroy 2 years after the end of the FY of preparation.
1403-12	**Military urgency planning list files.** Documents relating to the military urgency planning list of items published by the Department of Defense. Included are copies of the lists and documents connected with nomination of items for the list.	Offices responsible for preparation and issue: Record copies of lists are permanent. Other files: Destroy on publication of information. Other offices: Destroy after 2 years, except that copies of lists will be destroyed when superseded or no longer required for reference, whichever is first.
1403-13	**Interservice inspection files.** Documents relating to the performance of inspection services for other procuring activities as outlined in Section XIV, APP.	Destroy 6 years after completion of inspection action on the related contract. However, in the event inspection docu-

1420 MAINTENANCE FILES

These files relate to the program designed to keep equipment in working condition. They accumulate incident to the receipt, operation, maintenance, management, modification, reporting, transfer, and disposal of equipment. These files relate only to the maintenance of items of supply, including depot maintenance where applicable, and not to the maintenance of real or installed property. Unless longer retention periods are specified herein, files relating to an item of equipment involved in an accident causing possible injury or death or damage to property of others, or known to be pertinent to a pending claim or litigation will not be destroyed but will be withdrawn and retained until settlement of the claim or completion of the litigation or until 2 years after such accident, whichever is later.

File No.	*Description*	*Disposition*
1420-01	**Calibration data card files.** Cards used to record each standard, or item of test and measuring equipment requiring a calibration service and to record calibration accomplishment.	Master file will be forwarded to the appropriate commodity command on final disposition of related instrument. Other copies: Dispose of in accordance with TM 38-750.
1420-02	**Historical record or logbook files.** TM 38-750 prescribes the use of equipment logbooks and maintenance historical files. This record begins at the time of delivery of the equipment by the manufacturer and is identified with and travels with the item of equipment until it is dropped from the Army inventory. These historical maintenance documents provide commanders with up-to-date information concerning the readiness and condition of equipment. In addition, by checking the records accompanying the equipment, maintenance personnel are readily aware of the past maintenance accomplished and can quickly determine the next necessary maintenance. TM 38-750 lists the various forms constituting the historical record, provides transfer and/or disposition instruction for the forms, and outlines procedures to be followed in disposition or transfer of the documents related to equipment involved in Military Assistance Programs. TM 38-750 also lists each type of equipment for which an historical file is to be created and maintained.	Dispose of in accordance with TM 38-750.
1420-03	**Maintenance summary and management files.** Documents relating to the summarization of data to the general management of maintenance operations and functions. Copies of various operationally prepared forms (commonly referred to as control copies) containing detailed data of value in managing such aspect of maintenance as forecasting workloads, scheduling work for orderly flow, worktime standards and routing of work, parts supply, cost control, quality control, operation improvement, and equipment improvement are reviewed, analyzed, and summarized. Normally, EAM or ADP equipment is used for transferring pertinent data from the various forms to cards and/or tapes from which numerous summarizations and reports may be machine prepared. These reports reflect (in many combinations) information on cost and time; labor utilization; repairs, services, and parts; parts failure; modification work order progress by end item or by work order number; equipment improvement; combined maintenance; repairs-services-parts; combined maintenance, parts failure; equipment status; equipment deadlined; equipment inventory;	Offices performing Army wide staff responsibility: Consolidated reports and summaries affecting policy, precedent, and procedure—permanent; Other reports—destroy when they have served their intended purpose; Feeder reports—destroy on extraction of necessary data. Other offices: Consolidated reports and summarizations—destroy when they have served their intended purpose; Feeder reports—destroy on extraction of necessary data.

File No.	Description	Disposition
	materiel readiness; and similar or related data. Included are reports, summaries, listings, tabulations and machine runs. "Control" copies of documents containing supporting and subsidiary data and punched cards containing the information in "machine language" should be filed and disposed of as reference paper files, or data processing files described in AR 340-18-2.	
1420-04	**Item maintenance engineering files.** Documents created in maintenance engineering of development, reproduction, or standard items of material to determine maintenance support required; assure incorporation of ease of maintenance in design; improve maintenance operations on existing items; reduce amount and frequency of, and skills required in, maintenance; and in the resulting preparation, coordination, and issue of equipment technical manuals and bulletins, lubrications orders, and modification work orders. Included are contributions to and comments on maintenance specifications; maintenance support plans for development items; reports or minutes of maintenance evaluation reviews or other meetings conducted during development and production of an item; reports, drawings, and similar papers resulting from investigating and correcting deficiencies or otherwise modifying the materiel; and draft copies of the published equipment publications and communications relating to them.	Office responsible for preparation: Destroy 6 years after publication of the related order, manual, bulletin, or other publication or on termination of the project when no such publication is issued. Other office: Destroy after 2 years, or 2 years after publication of the related equipment publication, except that Equipment Improvement Recommendations maintained by National Maintenance Points will be destroyed after 6 years.
★1420-05	**Maintenance management inspection files. Rescinded.** Function discontinued.	
1420-06	**Maintenance technical assistance files.** Reports and related papers accumulating from the conduct of technical assistance programs designed to furnish technical assistance and advice to improve the performance of organizational and field maintenance.	Office performing Army wide staff responsibility: Permanent. Other offices: Destroy when superseded, obsolete, or no longer needed for current operations, whichever is first.
1420-07	**Support unit record files.** Documents maintained by supporting maintenance elements to provide pertinent information relative to units supported, such as official designation of the unit; applicable TOE; location; current listings of equipment eligible for support; names of air, supply, maintenance, and key noncommissioned officers; copies of latest inspection reports; copies of latest work request and job order; and similar data. Transfer to new supporting element on transfer of the supported unit.	Destroy on obsolescence of the data or on discontinuance of the supported unit, whichever is first.
1420-08	**Equipment operator permit files.** Documents used to authorize individuals to operate Government equipment.	Destroy 3 years from date of issue or when revoked by proper authority, whichever occurs first.
1420-09	**Equipment operator permit register files.** Registers or comparable documents used to account for equipment operator permits issued.	Destroy 3 years after the last entry on the page or in the bound register.
1420-10	**Dispatcher organizational control record files.** Documents reflecting the dispatch of equipment. Normal information includes name of user, time out, destination, equipment identification, and estimated time of return.	Destroy after 1 month.
1420-11	**Equipment daily utilization files.** Documents completed by dispatcher and operator to provide information relative to the daily use of equipment and reports reflecting driver description of Army motor vehicle accidents.	Destroy after required transfer of information to other records, unless required for accident investigation or state gasoline tax purposes.

File No.	Description	Disposition
1420-12	**Maintenance request files.** Documents used to request maintenance services, to report accomplishment of modification work orders, to record maintenance performed, to report receipt of defective material, and to submit equipment improvement recommendations. A single form is prescribed for use as an individual work request, as a report of modification accomplishments, as an equipment improvement recommendation, or for use in recording two or all three of these functions. Related records to this form include transfer and rejection memoranda, property issue and turn-in slips, labor time tickets, and similar papers.	Dispose of as provided by TM 38-750.
1420-13	**Maintenance request register files.** Documents used to record and control maintenance work; these documents are usually in the form of registers.	★Destroy 6 months after last entry.
1420-14	**Exchange tag files.** Documents (normally tags) used as receipts for replacement of parts or components.	Destroy on return or issue of related equipment
1420-15	**Shop property account files.** Documents accumulating in tool rooms, parts rooms, and exchange points in making maintenance items more accessible to maintenance personnel. Included are stock record cards, vouchers, registers, direct exchange cards, property issue and turn-in slips, and similar documents reflecting the issue, turn-in, and usage of items, such as repair parts, kits, tools, and assemblies. These documents may also constitute a section of the accountable officer's stock record account or may be subsidiary thereto. Stock record cards and direct exchange cards should be continued in use until filled or final entry is made thereon.	Destroy after 2 years.
1420-16	**Shop locator record files.** Location sheets, cards, tags, and other documents constituting a part of a location, inventory, or identification system for equipment sent to shops, or utilized as a check or inventory for such equipment. Reusable forms should be used until filled.	Destroy on return or reissue of related equipment.
1420-17	**Preventive maintenance schedule files.** Documents used for scheduling periodic preventive maintenance services, load tests, and calibration of assigned equipment This schedule should be transferred with the related equipment when the equipment is transferred.	Destroy after transferring the required information to other records or on disposition of the related equipment, whichever is first.
1420-18	**Equipment inspection and maintenance worksheet files.** Documents reflecting the performance of preventive maintenance inspections, services, diagnostic checkouts, and spot check inspection of equipment.	Destroy on posting to related equipment log book, on entering deficiencies on a new form, or on completion of next serviceability test or check, as applicable.
1420-19	**Installed and spare engine reporting files.** Documents relating to reports indicating Army aircraft engines in stock or installed on fixed wing aircraft and helicopters. Data for preparation of these reports are contained in aircraft flight reports and maintenance and historical records for aeronautical equipment.	Office performing Army-wide staff responsibility: Destroy after 5 years. Other offices: Destroy after 1 year.
1420-20	**Army aircraft inventory, status, and flying time reporting files.** Documents accumulated in Army commands and organizations as a result of reporting to higher headquarters data pertaining to aircraft held on an accountable basis. They consist of such reports as DA Form 1352, Army Aircraft Inventory, Status, and Flying Time, comparable forms, proof listings, transmittal listings, and related papers.	Offices performing Army-wide staff responsibility: Permanent. Other offices of the Army staff: Destroy after 2 years. Offices preparing or reviewing report: Destroy after 1 year.
1420-21	**Engine log or run-in data files.** Reports reflecting time, speed, load pressures, temperatures, and other features determined in the process of testing internal combustion engines.	Destroy after 2 years.

1431 PETROLEUM AND SOLID FUEL SUPPLY FILES

These files relate to the receipt and issue of petroleum products and solid fuels.

File No.	Description	Disposition
1431-01	**Petroleum supply reporting files.** Petroleum supply program reports reflecting consumption, requirements, stock status, conservation data, and similar information.	Office performing Army-wide staff responsibility: Destroy after 5 years. Other offices of the Army staff and intermediate commands: Destroy after 1 year. Preparing field offices: Destroy after 3 years.
1431-02	**Gasoline and lubricant issue files.** Documents relating to the issue of gasoline and lubricants. Included are slips and abstracts of gasoline and lubricants issued.	Destroy after 1 year.
1431-03	**Petroleum product analysis reporting files.** Documents created incident to the testing of petroleum products as they pertain to the acceptability of such products in connection with new procurement, or the analyses as required of petroleum units in custody of Army storage facilities. A copy of petroleum analysis report submitted to a contracting officer, as required when a contractor has failed to meet contract requirements, will be filed in the procurement file to which it relates, for disposition with the related procurement file.	Destroy after 2 years.
1431-04	**Solid fuel control files.** Documents relating to the receipt, storage, and use of solid fuels. Included are copies of annual and supplemental requisitions received from installations and activities, copies of contracts, shipping notices, receiving reports, analysis reports, reports of burning tests, rejection reports, similar documents, and related papers.	Office performing Army-wide staff responsibility: Destroy after 2 years. Creating Offices: File in and dispose of with the appropriate related procurement file.
1431-05	**Solid fuel perpetual inventory files.** Documents reflecting stocks of solid fuel on hand.	Destroy when card or form is filled and appropriate entries have been carried forward.
1431-06	**Solid fuel requirement and estimate files.** Documents used in determining future requirements for solid fuels. Included are copies of purchase requests, requirements estimates, reports, and related papers.	Office performing Army-wide staff responsibility: Destroy when no longer required in making future determinations. Other offices: Destroy after 2 years.

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File No.	
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1432-02	Port ex uisiti suppl repo docu route comp on de corre follo
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1432-04	Port A cumu essin Arm tions purcl relat
1432-05	Port d shipn shipr but e
1432-06	Port c sion perf They form spect stock of av to sh

1434 SUPPLIES DISPOSITION FILES

These files are accumulated incident to the program for the disposition of surplus, salvage, and scrap property, and the redistribution of excess property. Specifically, the files pertain to the disposal of property determined surplus to the needs of the military establishment, the scrapping or other steps taken for the disposal of condemned, discarded, or abandoned property, or of materials contained therein, and the redistribution of supplies which exceed those authorized for the particular organization or supply component. Files described in this category that are involved in claims, litigation, or investigations will be withdrawn on expiration of prescribed retention periods for disposal after proper settlement of the claim, litigation, or investigation.

File No.	Description	Disposition
1434-01	**Property disposal account files.** Documents maintained by property disposal activities, such as vouchers and supporting documents and attachments thereto, including stock record cards or equivalent forms used in lieu thereof, such as property turn-in slips and shipping documents. This description will not be construed to include accounts which involve the receipt of surplus, salvage, or scrap property from contractors, or property related to contract property accounts. Unfilled stock record cards will be retained in the active files until filled, or until final entry is made thereon.	Destroy after 2 years.
1434-02	**Property disposal reporting files.** Documents relating to the reporting of excess property in order that information on availability of excess property may be disseminated to all authorized recipients and for effecting maximum practical use of such property. Included are reports and related papers.	Office preparing report: Destroy after 2 years. Office receiving report: Destroy on completion of consolidation or summary.
1434-03	**Film disposal files.** Documents relating to the destruction of training film and filmstrips. Included are notices of destruction, certificates of destruction, and correspondence on film disposal.	Destroy after 2 years.
1434-04	**Lease and rental case files.** Documents relating to individual leases or rentals of Government-owned equipment to private concerns or individuals. Included are invoices, shipping documents, collection vouchers, agreements, and related papers.	Destroy 6 years after close of FY in which final collection of rentals is made.
1434-05	**Sales contract register files.** Registers maintained to control and record the assignment of numbers to sales contracts, contractor's name and address, types of material sold, and term of contract.	Destroy 3 years after close of FY following last entry on individual sheet or in register.
1434-06	**Sales contract files.** Documents relating to the sale of surplus and foreign excess personal property, abandoned private property, and contractor inventory. Included are invitations for bids; amendments to bids; bids and acceptance; abstracts of bids; statements and notices of awards; lists of successful bidders; contracts, changes, and supplement thereto; collection and deposit documents; and related papers.	Destroy 3 years after close of FY in which final payment is made.
1434-07	**Unsuccessful and rejected bid files.** Unsuccesful and rejected bids maintained as a separate file and not as a part of an individual sales contract.	Destroy 3 years after close of FY in which issued, except that bids returned without bid action will be destroyed immediately after bid opening.
1434-08	**Retail sale files.** Documents relating to retail sales of surplus and foreign excess personal property, abandoned property, and contractor inventory. Included are cash sales slips, cash register tapes, retail sales books, and related papers.	Destroy 3 years after close of FY in which sale is completed.
1434-09	**Sales contract review files.** Documents relating to the review of sales transactions. Included are copies of bids, abstracts of bids, contracts, and related papers.	Offices responsible for review: Destroy after 2 years.

File No.	Description	Disposition
1434-10	**Small arms sales record files.** Documents relating to sales of small arms, ammunition, targets, and related supplies to members of the National Rifle Association and other authorized individuals. Included are ODCM Form 1, ODCM Form 5, OSA Form 66, or forms used for similar purposes, shipping documents, and related papers.	Destroy 2 years after transfer of pertinent data to Rifle Sales Record or similar form.
1434-11	**Surplus property declaration files.** Documents relating to the declaration of surplus and excess property to a disposal agency. Included are surplus property declarations to a disposal agency, and correspondence with the disposal agency on such declarations.	Offices of accountable property officers: Destroy 1 year after disposal of property. Offices of the Army staff: Destroy 10 years after completion of disposal action.
1434-12	**Property disposition reporting files.** Reports relating to the status and activity of all surplus declarations, transfers, or disposals of excess and surplus property and comparable matters relating to property disposition. Included are report of disposition of surplus military property and station excess serviceable stock report.	Offices preparing report: Destroy after 2 years. Offices requiring report: Summary or consolidated reports — destroy after 10 years; Feeder reports — destroy on consolidation or summarization.
1434-13	**Demilitarization and mutilation files.** Documents used to record nomenclature and quantities of military-type items of material demilitarized or mutilated prior to disposal action. Included are forms, ledger sheets, cards, and related papers.	Destroy after 3 years, except documents related to and filed with sales contracts will be disposed of with the related contract files.
1434-14	**Surplus property donation files.** Documents relating to the approval of requests for donations of surplus property to educational institutions. Included are applications for donations listing property requested, and related papers.	Destroy after 3 years.
1434-15	**Excess property donation files.** Documents reflecting the donation of obsolete combat material, books, manuscripts, works of art, drawing plans, and models, not needed by the Department of Defense, to veterans organizations, state museums, educational museums operating under charters forbidding the accumulation of profit, and municipal corporations. Included are shipping orders, shipping documents, schedule of collections, and related papers.	Destroy after 2 years, provided transactions pertaining to active or open memorandum receipt accounts have been settled or included in subsequent consolidated memorandum receipts.

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AR 340-18-15

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S/S 15 August 1981 (microfiche copy)

ARMY REGULATION

AR 340-18-15

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OFFICE MANAGEMENT

MAINTENANCE AND DISPOSITION OF FACILITIES FUNCTIONAL FILES

Effective 1 January 1970

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CHANGE No. 10

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *1 February 1980*

OFFICE MANAGEMENT

MAINTENANCE AND DISPOSITION OF FACILITIES FUNCTIONAL FILES

Effective 1 March 1980

This change revises records descriptions or disposition instructions for file numbers 1504-22, 1513-01, 1513-03, 1514-11, 1518-01, and 1519-03; establishes file numbers 1511-12, 1511-13, 1511-14, and 1511-15; and provides general updating.

Interim changes to this regulation are not official unless they are authenticated by The Adjutant General. Users will destroy interim changes on their expiration date unless sooner superseded or rescinded.

AR 340-18-15, 14 August 1969, is changed as follows:

1. Changed material is indicated by a star.

2. Remove old pages and insert new pages as indicated below:

Remove pages	*Insert pages*
11 and 12	11 and 12
23 through 30	23 through 29
35 through 38	35 through 38

3. File this change sheet in front of the publication for reference purposes.

The proponent agency of this regulation is the Adjutant General Center. Users are invited to send comments and suggested improvements on DA Form 2028 (Recommended Changes to Publications and Blank Forms) to HQDA(DAAG-AMR-P) WASH DC 20314.

This change supersedes Interim Change I01, AR 340-18-15, 5 November 1979.

12 September 1974
14 August 1969

C 5, AR 340-18-15
*AR 340-18-15

ARMY REGULATION
No. 340-18-15

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *14 August 1969*

OFFICE MANAGEMENT

MAINTENANCE AND DISPOSITION OF FACILITIES FUNCTIONAL FILES

Effective 1 January 1970

Local supplementation of this regulation is prohibited except upon approval of the Adjutant General

1. Applicability. ★ *a.* This regulation is applicable to all Department of the Army elements except active Army TOE units below division level, Army Reserve elements, ROTC elements, Army National Guard Units, and TDA units conducting Basic Combat Training or Advanced Individual Training.

b. Offices responsible for facilities functions will use this regulation to identify, maintain, and dispose of records documenting these functions. The identification, maintenance, and disposition of records of this nature maintained by other offices will be governed by AR 340-18-1 and/or the Army regulation in the 340-18 series pertaining to the function of that office.

2. Related regulations. AR 340-18-1 contains basic procedures to be used with the Army Functional Files System and the file numbers, descriptions, and retention periods for Office Housekeeping Files. File numbers, descriptions, and retention periods for files relating to major categories of records documenting mission functions are contained in Army Regulations 340-18-2 through 340-18-15 which are distributed only to the organizations performing the functions concerned.

3. Scope. Under the Army Functional Files System, files relating to the major functional category of Facilities have been assigned the basic file number 1500. This regulation contains file numbers, descriptions, and retention periods for files relating to acquisition, utilization, management, and disposal of real property; design and construction of military projects; installation maintenance; operation of utility plants; performance of engineering services in connection with installations; accounting for real and installed property; housing; cemetery administration; engineering studies; and design, construction, operation, and maintenance of civil works projects activities. Common Mission Files are described in this regulation under file numbers 1501-01 through 1501-08. Other mission files are grouped into 24 subfunctional categories, as follows:

***This regulation, together with AR 340-18-1, AR 340-18-2, AR 340-18-3, AR 340-18-4, AR 340-18-5, AR 340-18-6, AR 340-18-7, AR 340-18-8, AR 340-18-9, AR 340-18-10, AR 340-18-11, AR 340-18-12, AR 340-18-13, and AR 340-18-14 all dated 14 August 1969 supersedes AR 340-210, 31 October 1962, including all changes.**

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Subfunctional category file No.	Subfunctional category file title	Page No.
1502	Installation selection, evaluation, and master planning files	6
1503	Real property acquisition files	8
1504	Real property management and utilization files	10
1505	Real property disposal files	13
1506	Homeowners assistance files	14
1507	Army and Air Force Exchange Service facilities files	15
1508	Real property general maintenance files	16
1509	Facilities engineering files	20
1510	Fire prevention files	22
1511	Army housing files	23
★1512	Environmental pollution files	25
1513	Basic engineering files	26
1514	Engineering investigations and studies files	27
1515	Military planning, design, and construction files	29
1516	Civil defense planning and programing support files	32
1517	Civil works planning files	33
1518	Civil works project construction files	35
1519	Construction contract files	37
1520	Civil works project operation and maintenance files	41
1521	Civil works plant files	43
1522	Navigable waterways files	45
1523	Waterborne commerce statistics files	47
★1524	Miscellaneous civil works activities files	49
1525	Cemetery files	51

ORIGINAL (Red)

1508 REAL PROPERTY GENERAL MAINTENANCE FILES

These files relate to the general maintenance and repair of Government real property (exclusive of utilities plants and systems) and the related activities of custodial services; packing and crating; entomology, land, forest, and wildlife management; landscape plantings and beautification equipment utilization and shop operations; and service or user testing of new materials utilized in maintenance activities. It also includes real property historical records, such as as-built drawings and individual item cards.

File No.	*Description*	*Disposition*
1508-01	**Maintenance correspondence files.** Correspondence relating to supervision and performance of real property maintenance, but exclusive of specific files described in this category.	OCE: Permanent. Field offices: Destroy after 6 years.
1508-02	**Installation maintenance program files.** Documents relating to long-range programs which concern the upkeep of buildings, roads, railroads, and grounds, including insect and rodent control and sanitary fill and dump areas, or other documents necessary to maintain essential data on the conditioning of the above facilities. These files will be retained at the installation and will remain with the buildings and grounds when transferred from the jurisdiction of the Army.	Permanent.
1508-03	**Building maintenance files.** Documents relating to the criteria, standards, practices, and application of measures for the maintenance, repair, and improvement of buildings and structures at military installations.	Offices performing Army-wide staff responsibility: Permanent. Other offices: Destroy when superseded, obsolete, or no longer required for reference, whichever is first.
1508-04	**Ground maintenance files.** Documents relating to the criteria, practices, and application of measures for the development and improvement of lands of military reservations, including cemeteries and golf courses.	Offices performing Army-wide staff responsibility: Permanent. Other offices: Destroy when superseded, obsolete, or no longer required for reference, whichever is first.
1508-05	**Entomology service files.** Documents relating to the criteria, practices, and application of measures for insect and rodent control for the protection of personnel, material, buildings, and other facilities.	Offices performing Army-wide staff responsibility: Permanent. Other offices: Destroy when superseded, obsolete, or no longer required for reference, whichever is first.
1508-06	**Sanitary service files.** Documents relating to standards and practices in the collection and disposal of refuse, and the collection of salvage, including communications about methods of refuse disposal and collection systems, and documents similar in content.	Offices performing Army-wide staff responsibility: Destroy after 10 years. Other offices: Destroy when superseded, obsolete, or no longer required for reference, whichever is first.
1508-07	**Custodial service files.** Documents relating to the criteria and procedures for the performance of cleaning, janitorial, and preventive maintenance standards services at Army installations.	Offices performing Army-wide staff responsibility: Permanent. Other offices: Destroy when superseded, obsolete, or no longer required for reference, whichever is first.
1508-08	**Custodial property accountability files.** Inventories of installed property, miscellaneous property lists, transfer of property documents, shipping documents, receiving reports, and related correspondence. These documents are maintained by Corps of Engineers representatives designated to assume accountability of an installation declared excess to Army needs.	Destroy after 2 years.

1512 WATER AND AIR POLLUTION FILES

These files relate to action taken within the Army to abate water and air pollution.

No.	Description	Disposition
1512-01	Air pollution abatement files. Documents relating to the criteria, practice, and application of measures to prevent air pollution or to abate such air pollution as may exist. Included are inventories of sources of air pollution, annual report describing progress in accomplishing the objectives of the air pollution abatement plan, and related or similar documents.	Offices performing Army-wide staff responsibility: Consolidated or summary reports: Permanent. Other offices: Destroy when superseded, obsolete, or no longer required for reference, whichever is first.
1512-02	Air pollution complaint files. Documents relating to complaints regarding alleged air pollution by activities at Army installations. Included are letters of complaint, investigations or studies, replies to complaints, and similar or related documents.	Destroy 10 years after close of case.
1512-03	Water pollution abatement files. Documents relating to the criteria, practices, and application of measures to prevent water pollution or to abate water pollution as may exist, such as annual report of waste disposal practices and plans for improvement.	Offices performing Army-wide staff responsibility: Consolidated or summary reports; Permanent. Other offices: Destroy when superseded, obsolete, or no longer required for reference, whichever is first.
1512-04	Water pollution complaint files. Documents relating to complaints regarding alleged water pollution by activities at Army installations. Included are letters of complaint, investigations or studies, replies to complaints, and similar or related documents.	Destroy 10 years after close of case.
1512-05	Water and air pollution supervisory files. Documents maintained by Corps of Engineer division offices that duplicate the files maintained in subordinate offices, as described herein.	Destroy 1 year after the prescribed cut off for the subordinate office copy. Earlier destruction is authorized.

★1512 EVIRONMENTAL POLLUTION FILES

These files relate to action taken within the Army to abate environmental pollution.

File No.	Description	Disposition
1512-01	**Environmental pollution abatement files.** Documents relating to the criteria, practice, and application of measures to prevent water, air, noise, or ground pollution or to abate such pollution as may exist. Included are inventories of sources of pollution, annual report describing progress in accomplishing objectives of environmental pollution abatement plans, and related or similar documents.	Offices performing Army-wide staff responsibility: Consolidated or summary reports: Permanent. Other offices: Destroy when superseded, obsolete, or no longer required for reference, whichever is first.
1512-02	**Environmental pollution complaint files.** Documents relating to complaints regarding alleged environmental pollution by activities at Army installations. Included are letters of complaint, investigations, or studies; replies to complaints; and similar or related documents.	Destroy 10 years after close of case.
1512-03	**Water pollution abatement files.** Rescinded. Use file number 1512-01	
1512-04	**Water pollution complaint files.** Rescinded. Use file number 1512-02	
1512-05	**Environmental pollution supervisory files.** Documents maintained by Corps of Engineer division offices that duplicate the files maintained in subordinate offices, as described herein.	Destroy 1 year after the prescribed cutoff for the subordinate office copy. Earlier destruction is authorized.

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RECORDS

RECORDS MANAGEMENT
FILES SYSTEMS AND STANDARDS

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PART TWO

FILES SYSTEMS AND ARRANGEMENTS

CHAPTER 1

FUNCTIONAL FILES SYSTEM

3. Introduction. This part explains the principle and the application of the Army Functional Files System, the use of functional file numbers, and the preparation of labels under the Functional Files System. It also describes methods of identifying and arranging file subdivisions under the Functional Files System.

★**4. Definition.** The Functional Files System is a method of classifying records by numbers which represent the authority for disposition of files. These numbers are also associated with specific functions performed by elements of the Army. Thus, these numbers provide a classification scheme which is used in record filing, reference, and disposition operations.

★**5. Principles of the system.** *a.* The Army Functional Files System is the prescribed method for establishing, maintaining, and disposing of files in all elements of the Army. It is predicated on the principle that each organizational element in the Army, to fulfill its mission, performs functions that result in the accumulation of records reflecting and documenting the performance of those functions. The objective of the system is the establishment, maintenance, and disposition of files based on the specific functions performed by organizational elements. To achieve this objective, documents are identified and grouped in entities designated as "files." These entities reflect relatively specific transactions or processes that are accomplished in performing the functions. File entities are described in part five of this regulation.

b. The numbers assigned to the file entities described in part five serve both as an identification for filing and reference and as an abbreviated citation of the disposition authority. Under this system, all files relating to the same functional area are identified for filing, first by the numerical classification applicable to that particular functional and subfunctional area, and secondly by the number applicable to the particular processes concerned. The specific file number is derived from the internal arrangement of, and the sequence in which files are described in, part five. For example, File No. 307–09 is derived as follows:

File number: 3 07 09
Chapter
Section
File description item

c. File numbers are composed of three significant elements: the chapter number, the section number, and the number of the specific file entity or item. Thus, in the above example, the first number (3) represents chapter 3 which describes records created in the major functional area of finance and fiscal administration. The second number (07) represents section VII of chapter 3 which describes records created in the nonappropriated fund subfunctional area of finance and fiscal administration. The third number (09), following the hyphen, represents item 9 of section VII, which specifically describes files accumulated in the process of administering welfare fund accounts. The file number for the records described as Welfare Fund account files, therefore, is 307–09.

6. Applicability of system. The Functional Files System will be used by all elements of the Department of the Army. It will be applied as follows:

a. All unclassified files and all classified files through SECRET will be constituted under the Functional Files System.

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PART FOUR
FILES DISPOSITION PROCEDURES

CHAPTER 1
INTRODUCTION

49. Objective. One of the primary objectives of the Army records management program is to preserve records of continuing value, systematically eliminate all other records, and remove less active records from office space to low-cost storage space. The purpose of this action is to increase the usefulness of the records which are preserved and reduce the cost and effort of record keeping. To achieve this objective, procedures and standards have been established for the orderly disposition of all Army files.

50. Basic instructions. Basic procedures for the orderly and systematic preservation or disposition of Army files are provided in this part.

51. Source of disposition standards. Standards for the disposition of specific Army files are published in part five.

52. Establishment of disposition standards. Disposition standards for files not presently covered by Department of the Army directives on records management are established on the basis of analyses made by The Adjutant General. The heads of agencies and major commanders will submit recommendations for the disposition of files not covered by existing disposition standards only as requested by The Adjutant General. Recommendations for changes to existing standards will be submitted without prior approval of The Adjutant General only when necessary to resolve conflicting instructions between these and other regulations.

53. Changes in disposition standards. Disposition standards are changed periodically as a result of a continuing evaluation of files and changes in statutory requirements, administrative procedures, and methods. These changed standards are applied in accordance with the general rules stated below unless specific instructions to the contrary are prescribed in individual cases.

a. Increased retention period. If the changed standard increases the retention period, the standard will be applied to all files of that description regardless of where they are maintained or when they were created. Positive steps will be taken to insure that inactive and cutoff files are brought under the new disposition standard.

b. Reduced retention period. If the changed standard reduces the retention period, the standard will be applied retroactively unless it is impractical or uneconomical to do so. *For example*, if the new standard can be applied to inactive files only by screening files and marking folders on an individual basis, it normally would be more economical to retain the files for the longer period than to attempt to post the changes.

54. General files disposition procedures. *a. Identified files.* In some instances, the file descriptions in part five include specific standards for cutoff, establishment of inactive files, and retention periods and specific instructions as to the organizational levels at which the disposition standards apply. In other cases, however, only general disposition instructions are provided (e.g., 2 years, 10 years, upon supersession, 2 years after card is filled, etc.). In these cases, the word "destroy" is understood and the procedures described in paragraph 57 will be used in determining exact cutoff and disposition dates. Similarly, the absence of precise instructions concerning the location of the files indicates that the disposition instructions apply Army-wide wherever the files are accumulated.

b. Unidentified files. When files are created that are not described in part five, the instructions in

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paragraph 59 will be used in developing procedures for their disposition.

55. Files disposal requirements. *a. General.* Files authorized for destruction will be sold as waste paper, destroyed, or with the prior approval of The Adjutant General, transferred to any Government, organization, institution, or corporation which has made application for them.

b. Files salvage or disposal. Files authorized for destruction will be reported to the property disposal officer who will determine whether they will be destroyed or sold as waste paper in accordance with AR 755-7. Army contracts for the sale of files, however, will prohibit their resale if they have not been treated in a manner to destroy their content. Classified or registered documents, when authorized for disposal under approved disposal standards, will be destroyed according to the methods prescribed in AR 380-5. AR 380-5 in itself, however, *does not* constitute authority for disposal of classified documents, but prescribes only the methods by which such documents are to be destroyed. Disposal standards contained in Department of the Army records management directives are applicable to all categories of United States material, both classified and unclassified.

c. Transfer of files. Files authorized for destruction that possess historical or sentimental value unique to any Government, organization, institution, or corporation may be transferred on the request of such agency or organization with the prior approval of The Adjutant General, and without cost to the United States Government. All requests will include a description of the files, the organization possessing the files, and the agency to which the files are to be transferred.

56. Emergency or accidental disposal of records. *a. Emergency disposal.* Records in the custody of the Army outside the territorial limits of the continental United States may be destroyed, pursuant to the Records Disposal Act of 1943, at any time during the existence of a state of war between the United States and any other nation, or when hostile action by a foreign power appears imminent, if their retention is prejudicial to the interests of the United States. When emergency disposal is effected, a list of the files destroyed and the inclusive dates of each file will be compiled to the extent possible. This list will be forwarded to The Adjutant General, ATTN: AGAR.

b. Accidental disposal. In cases of accidental loss or destruction of files by fire or other causes, the following actions will be taken:

(1) Reconstruction of as much of the lost or destroyed permanent files as possible. Record sets of publications will be reconstructed by replacing the lost or destroyed publications with copies withdrawn from reference sets of publications, or by obtaining copies of the publications from surplus stocks or from copies distributed to their organizations. Other permanent files will be reconstructed in the same manner if the lost or destroyed documents can be identified and copies can be obtained from other sources.

(2) When it is not possible to reconstruct permanent files, they will be identified on a Records Shipment List (DA Form 2172) at the time of transfer of records of the same date period to a records holding area or oversea records center. This information, in turn, will be included on DA Form 2172 at the time of retirement of related records to a records center in the continental United States.

ORIGINAL (Red)

CHAPTER 2

FILES DISPOSITION INSTRUCTIONS

57. Disposition procedures. The procedures for the cutoff and disposition of files based on standards for specific time periods and events are as follows:

a. One month. Files having a retention period of 1 month or 30 days will be cut off at the end of each month, held 1 month in the current files area, and destroyed.

b. Three months. Files having a retention period of 3 months or 90 days will be cut off at the end of each quarter, held 3 months in the current files area, and destroyed.

c. Six months. Files having a retention period of 6 months will be cut off semiannually as of 30 June and 31 December of each year, held 6 months in the current files area, and destroyed.

d. One year. Files having a retention period of 1 year will be cut off at the end of the calendar year or fiscal year, as applicable, held 1 year in the current files area, and destroyed.

e. Two years. Files having a retention period of 2 years will be cut off at the end of the calendar year or fiscal year, as applicable, and disposed of as follows:

(1) Files of offices of Headquarters, Department of the Army, and certain field command headquarters which have been granted exceptions by The Adjutant General to follow Headquarters, Department of the Army disposition procedures, will be held in the current files area until the expiration of the 2-year period and then destroyed.

(2) Files of elements of Army field commands other than those headquarters authorized to follow Headquarters, Department of the Army disposition procedures will be held 1 year after cutoff in the current files area, then transferred to the records holding area or appropriate oversea records center where they will be held until expiration of the 2-year period and then destroyed. Where records holding areas in CONUS are not authorized, the files will be held in the current files area until expiration of the disposal time period.

f. Disposal standards over 2 years. Disposable files having retention periods of more than 2 years will be cut off at the end of each calendar or fiscal year, as applicable, and disposed of as follows:

★(1) Files of offices of Headquarters, Department of the Army, and certain field command headquarters which have been authorized by The Adjutant General to follow Headquarters, Department of the Army disposition procedures, will be held 2 years after cutoff in the current files area. The files will then be retired to the Washington National Records Center, GSA, where they will be held until expiration of their retention periods. Calendar year blocks of files will be retired in January and fiscal year blocks of files in July.

(2) Files of elements of Army field commands other than those headquarters authorized to follow Headquarters, Department of the Army disposition procedures will be held 1 year after cutoff in the current files area, then transferred to the records holding area or appropriate oversea records center. Files having a disposal standard of 6 years or less will be held for the remainder of the retention periods in the holding area or oversea center and then destroyed. Files having a disposal standard of more than 6 years will be held 2 years in the records holding area or oversea records center, and then retired on a calendar or fiscal year basis, as applicable, to the appropriate records center. Where records holding areas are not authorized or there is no oversea records center, the files will be held in the current files area until expiration of the disposal time period or until eligible for retirement, whichever is applicable. Calendar year blocks of files will be retired in January and fiscal year blocks of files in July.

g. Event or action. Files which are disposable upon the occurrence of an event, such as supersession or obsolescence, or the accomplishment of

File No.	Description	Disposition
1420-13	*Maintenance request register files.* Documents used to record and control maintenance work, normally in the form of registers.	1 year after the last entry on the page or in the bound register.
1420-14	*Exchange tag files.* Documents (normally tags) used as receipts for replacement of parts or components.	On return or issue of related equipment.
★1420-15	*Shop property account files.* Documents accumulating in tool rooms, part rooms, and exchange points in making maintenance items more accessible to maintenance personnel. Included are stock record cards, vouchers, registers, direct exchange cards, property issue and turn-in slips, and similar documents which reflect issue, turn-in, and usage of items, such as repair parts, kits, tools, and assemblies. These documents may also constitute a section of the accountable officer's stock record account or may be subsidiary thereto. Stock record cards and direct exchange cards should be continued in use until filled or final entry is made thereon.	2 years.
1420-16	*Shop locator record files.* Location sheets, cards, tags, and other documents constituting a part of a location, inventory, or identification system for equipment sent to shops, or utilized as a check or inventory for such equipment. Reusable forms should be used until filled.	On return or reissue of related equipment.
1420-17	*Preventive maintenance schedule files.* Documents used for scheduling periodic preventive maintenance services, load tests, and calibration of assigned equipment. This schedule should be transferred with the related equipment when the equipment is transferred.	After transferring the required information to other records or on disposition of the related equipment, whichever is sooner.
1420-18	*Equipment inspection and maintenance worksheet files.* Documents reflecting the performance of preventive maintenance inspections, services, diagnostic checkouts, and command materiel readiness inspections.	On posting of related equipment logbook, on entering deficiencies on a new form, or on completion of next serviceability test or check, as applicable.
1420-19	*Installed and spare engine report files.* Documents relating to reports indicating Army aircraft engines in stock or installed on fixed wing aircraft and helicopters. Data for preparation of these reports is contained in aircraft flight reports and maintenance and historical records for aeronautical equipment.	Office performing Army-wide staff responsibility: 5 years. Other offices: 1 year.
1420-20	*Army aircraft inventory, status, and flying time report files.* Documents accumulated in Army commands and organizations as a result of reporting to higher headquarters data pertaining to aircraft held on an accountable basis. They consist of such reports as DA Form 1352 (Army Aircraft Inventory, Status, and Flying Time), comparable forms, proof listings, transmittal listings, and related papers.	Offices performing Army-wide staff responsibility: Permanent. Cut off annually. Other offices at the Army staff: 2 years. Offices preparing or reviewing report: 1 year.
1420-21	*Engine log or run-in data files.* Reports reflecting time, speed, load pressures, temperatures, and other features determined in the process of testing internal combustion engines.	2 years.
1420-22	*Calibration data card files.* Cards created by the calibration facility for calibration standards and tests of measuring equipment.	Master file will be forwarded to the appropriate commodity command on final disposition of related instrument. Other copies: In accordance with TM 38-750.
1420-23	*Historical record or logbook files.* TM 38-750 prescribes the use of equipment logbooks and maintenance historical files. This record begins at the time of delivery of the equipment by the manufacturer and is identified with and travels with the item of equipment until it is dropped from the Army inventory. These historical maintenance documents provide commanders with up-to-date information concerning the readiness and condition of equipment. In addition, by checking the records accompanying the equipment, maintenance personnel are readily aware of the past maintenance accomplished and can quickly determined the next necessary maintenance. TM 38-750 lists the various forms constituting the historical record, provides transfer and/or disposition instructions for the forms,	As provided by TM 38-750.

ORIGINAL (Red)

File No.	Description	Disposition
1421-03	*Property disposal account files.* Documents maintained by property disposal activities, such as vouchers and supporting documents and attachments thereto, including stock record cards or any equivalent forms used in lieu thereof, such as property turn-in slips and shipping documents. However, this definition will not be construed to include accounts which involve the receipt of surplus, salvage, or scrap property from contractors, or property related to contract property accounts. Unfilled stock record cards will be retained in the active files until filled, or until final entry is made thereon.	2 years.
★1421-04	*Property disposal report files.* Documents relating to the reporting of excess property in order that information on availability of excess property may be disseminated to all authorized recipients and for effecting maximum practical use of such property. Included are reports and directly related papers.	Office preparing report: 2 years. Office receiving report: On completion of consolidation or summary.
1421-05	*Film disposal files.* Documents accumulated by property disposal activities and relating to the destruction of training film and filmstrips, including notices of destruction, certificates of destruction, and correspondence on film disposal.	2 years.
1421-06	*Lease administrative files.* Documents relating to the general administration of leasing and renting of Government-owned equipment, but exclusive of files relating to specific leases or rental agreements.	2 years.
1421-07	*Lease and rental case files.* Documents accumulated in connection with individual leases or rentals of Government-owned equipment to private concerns or individuals. Included are invoices, shipping documents, collection vouchers, agreements, and related papers.	6 years after close of FY in which final collection of rentals is made.
1421-08	*Sales contract register files.* Registers maintained to control and record the assignment of numbers to sales contracts, contractor's name and address, type of material sold, and term of contract.	3 years after close of FY following last entry on individual sheet or in register.
1421-09	*Sales contract files.* Documents accumulated incident to the disposal by sale of surplus and foreign excess personal property, abandoned private property, and contractor inventory. Included are invitations for bids; amendments to bids; bids and acceptances; abstracts of bids; statements and notices of awards; lists of successful bidders contracts, changes, and supplements thereto; collection and deposit documents; and similar or related papers.	3 years after close of the FY in which final payment is made.

ORIGINAL (Red)

File No.	Description	Disposition
1421-10	*Unsuccessful and rejected bid files.* Unsuccessful and rejected bids maintained as a separate file and not as a part of an individual sales contract.	3 years after close of FY in which issued, except that bids returned without bid action will be destroyed immediately after bid opening.
1421-11	*Retail sale files.* Documents relating to retail sales of surplus and foreign excess personal property, abandoned property, and contractor inventory. Included are cash sales slips, cash register tapes, retail sales books, and related or similar documents.	3 years after close of FY in which sale is completed.
1421-12	*Sales contract review files.* These files are accumulated from the review of sales transactions and consist of copies of bids, abstracts of bids, contracts and related documents, and correspondence.	Offices responsible for review: 2 years.
1421-13	*Small arms sales record files.* Documents accumulated from sales made to members of the National Rifle Association and other authorized individuals of small arms, ammunition, targets, and related supplies. They include ODCM Form 1, ODCM Form 5, OSA Form 66, or forms used for similar purposes, shipping documents, and related correspondence.	2 years after transfer of pertinent data to Rifle Sales Record or similar forms.
1421-14	*Surplus property declaration files.* Documents relating to the declaration of surplus and excess property to a disposal agency, including surplus property declarations to a disposal agency and correspondence with a disposal agency on such declarations.	Offices of accountable property officers: 1 year after disposal or property. Offices at the Army staff: 10 years after completion of disposal action.
1421-15	*Property disposition report files.* Reports and correspondence relating to the status and activity of all surplus declarations, transfers, or disposals of excess and surplus property and comparable matters relating to property disposition, including report of disposition of surplus military property and station, excess serviceable stock report.	Offices preparing reports: 2 years. Offices requiring reports: Summary or consolidated reports; 10 years. Feeder reports; on consolidation or summarization.
★1421-15.1	*Demilitarization and mutilation files.* Documents used to record nomenclature and quantities of military-type items of materiel demilitarized or mutilated prior to disposal action. Included are forms, ledger sheets, cards, and similar or related documents.	3 years, except that documents related to and filed with sales contracts will be disposed of with the related contract files.
1421-16	*Surplus property donation files.* Documents accumulated at headquarters which approve requests for donations of surplus property under their control to educational institutions. These files consist of applications for donations listing property requested, and related correspondence.	3 years.
1421-17	*Excess property donation files.* Documents accumulated at installations and activities which reflect the donation of obsolete combat material, books, manuscripts, works of art, drawing plans, and models not needed by the Department of Defense, to veterans organizations, State museums, educational museums operating under charters forbidding the accumulation of profit, and municipal corporations. The files include shipping orders, shipping documents, schedule of collections, and related papers.	2 years, provided transactions pertaining to active or open memorandum receipt accounts have been settled or included in subsequent consolidated memorandum receipts.
1421-18	*Supplies disposition reference paper files.* These papers relate to the disposition of surplus and excess property and consist of (1) copies of documents which duplicate the record copies filed elsewhere in the same Headquarters, Department of the Army agency, command headquarters, installation, activity, or unit; (2) documents which require no action; (3) rough drafts, notes, feeder reports, and similar working papers accumulated in preparation of a communication, study, or other document but exclusive of formal recommendations, coordination actions, and other papers which contributed to or resulted from preparation of the document; and (4) cards, listings, indexes and other papers used for controlling work.	Cut off every 3 months, 6 months, annually, or on completion of project. Destroy as blocks 3 months, 6 months, or 1 year after cutoff, or on completion of project. Use minimum of above periods that will meet reference needs.

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File No.	Description	Disposition
1503-30	*Repairs and utilities stock record account files.* Documents maintained by a post engineer which reflect by item the receipt, storage, maintenance, and disposition of real property, installed property, and repairs and utilities stock. These files include voucher registers, stock record cards or any equivalent forms used in lieu thereof; vouchers supporting postings to real property cards as copies of leases, transfers and acceptance of military real property forms, work orders, notices of cancellation of leases and reports of survey; vouchers supporting postings to installed property cards as transfers of new construction forms, copies of leases, requisitions on storekeepers, inventory adjustment reports, work orders, notices of cancellation of lease, reports of survey, project turn-in slips; and vouchers supporting postings to stock record cards for repairs and utilities stock as shipping documents, purchase orders, inventory adjustments reports, requisitions on storekeepers, reports of survey and property turn-in slips. Cards will be continued in effect until filled or until reduced to a zero balance.	2 years.
1503-31	*Installation facility service files.* Documents relating to the conduct of fire protection activities, the conduct of rodent and insect control programs, the performance of janitorial and refuse collection services, and the operation of repairs and utilities shops, including fire drill reports, insect and rodent control reports, and correspondence, but exclusive of documents defined under fire prevention and protection files.	2 years or on discontinuance of the installation, whichever occurs first.
★1503-31.1	*Air pollution abatement files.* Documents relating to the criteria, practices, and application of measures to prevent air pollution or to abate such air pollution as may exist. Included are inventories of sources of air pollution, annual report describing progress in accomplishing the objectives of the air pollution abatement plan, and related or similar documents.	Offices performing Army-wide staff responsibility: Consolidated or summary reports: Permanent. Cut off annually. Other offices: When superseded, obsolete, or no longer required for reference, whichever is first.
★1503-31.2	*Air pollution complaint files.* Documents relating to complaints regarding alleged air pollution by activities at Army installations. Included are letters of complaint, investigations or studies, replies to complaints, and similar or related documents.	10 years after close of case.
★1503-31.3	*Water pollution abatement files.* Documents relating to the criteria, practices, and application of measures to prevent water pollution or to abate water pollution as may exist, such as annual report of waste disposal practices and plans for improvement.	Offices performing Army-wide staff responsibility: Consolidated or summary reports: Permanent. Cut off annually. Other offices: When superseded, obsolete, or no longer required for reference, whichever is first.
★1503-31.4	*Water pollution complaint files.* Documents relating to complaints regarding alleged water pollution at Army installations. Included are letters of complaint, investigations or studies, replies to complaints, and similar or related documents.	10 years after close of case.
1503-32	*Entomology service files.* Documents relating to the criteria, practices and application of measures for insect and rodent control for the protection of personnel, material, buildings, and other facilities.	Offices performing Army-wide staff responsibility: Permanent. Cut off annually. Other offices: When superseded, obsolete, or no longer required for reference, whichever is first.
1503-33	*Sanitary service files.* Documents relating to standards and practices in the collection and disposal of refuse, and the collection of salvage, including communications about methods of refuse disposal and collection systems, and documents similar in content.	Offices performing Army-wide staff responsibility: 10 years. Other offices: When superseded, obsolete, or no longer required for reference, whichever is first.

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13

RECORDS

RECORDS MANAGEMENT TOE UNITS OF ACTIVE ARMY AND ARMY RESERVE

HEADQUARTERS, DEPARTMENT OF THE ARMY NOVEMBER 1962

ARMY REGULATIONS

No. 345-215

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D.C., *1 November 1962*

RECORDS

RECORDS MANAGEMENT—TOE UNITS OF THE ACTIVE ARMY AND THE ARMY RESERVE

Effective 1 January 1963

		Paragraph	Page
SECTION I.	GENERAL		
	Purpose	1	2
	Applicability	2	2
	Related regulations	3	2
II.	UNIT FUNCTIONAL FILES SYSTEM		
	Definition and application	4	2
	Principle of system	5	3
	Files identified in related regulations	6	3
	Unidentified files	7	3
III.	FILES ARRANGEMENTS		
	General	8	4
	Date arrangement	9	4
	Numerical arrangement	10	4
	Alphabetical arrangement	11	4
IV.	FILES PROCEDURES		
	General	12	5
	Labeling	13	5
	Use of guides and folders	14	6
	Position of guides	15	6
	Position of folder labels	16	6
	Folder and guide arrangement	17	6
	Assembling correspondence for file	18	6
	Indicating file classification on papers	19	7
	Fastening papers for file	20	7
	Charging-out files	21	7
V.	FILES EQUIPMENT AND SUPPLIES		
	General	22	8
	Standard equipment	23	8
	Nonstandard equipment	24	8
	Standard supplies	25	8
	Nonstandard supplies	26	8
VI.	DISPOSITION STANDARDS		
	General	27	8
	Reference aids for file numbers and standards	28	8
	Standard disposition instructions	29	9
	Disposition of unidentified files	30	10
VII.	DISPOSITION OF FILES OF UNITS CHANGING STATUS		
	Orders changing status	31	10
	Redesignation or reorganization	32	10
	Discontinuance	33	10
	Reduction to zero strength	34	10
	Transferred less personnel and equipment	35	10
	Reserve and National Guard units	36	10
	Units preparing for oversea movement	37	10
	Units of the United States Strategic Army Corps	38	11
	Units in oversea commands	39	11

*These regulations supersede AR 345-292, 14 November 1958, including C 2, 14 December 1959; C 3, 24 October 1960, and C 4, 9 October 1961.

		Paragraph	Page
SECTION VIII.	DISPOSAL PROCEDURES		
	Methods of disposal	40	11
	Emergency disposal	41	11
	Files accidentally lost or destroyed	42	12
IX.	PACKING AND SHIPPING PROCEDURES		
	Shipping containers and related supplies	43	12
	Shipping containers for odd-size documents	44	13
	Records shipment lists	45	13
	Preparation instructions	46	14
	Packing procedures	47	15
	Shipping procedures	48	15
	Packing and shipping TOP SECRET files	49	16
	Packing and shipping SECRET and CONFIDENTIAL files	50	17
	Packing and shipping CONFIDENTIAL—Modified Handling Authorized files	51	18
APPENDIX I.	OFFICE ADMINISTRATIVE FILES		19
II.	PLANNING AND MANAGEMENT FILES		20
III.	FINANCE AND FISCAL FILES		23
IV.	LEGAL AND INFORMATION SERVICES FILES		25
V.	INTELLIGENCE AND SECURITY FILES		26
VI.	MILITARY PERSONNEL FILES		28
VII.	EDUCATION AND TRAINING FILES		33
VIII.	COMMUNICATIONS SERVICES FILES		35
IX.	SUPPLY FILES		37
X.	RECORDS CENTER LISTING		42

Section I. GENERAL

1. Purpose. These regulations are designed to simplify the administration of records in certain TOE units and other units and activities of the Army. These regulations contain instructions for identifying and arranging files, for filing papers and furnishing reference service from files, for the use of files equipment and supplies, and for the disposition of files.

2. Applicability. These regulations are applicable to the following units and activities:

a. Active Army TOE units below the division level.

b. All units of the Army Reserve.

c. Offices of USAR area commanders, offices of unit advisors, and offices of training center supply officers.

d. Reserve Officer Training Corps units and camps.

e. U.S. Army Advisor Groups (NGUS).

3. Related regulations. Units having special type missions which result in the creation and accumulation of files which are not described in these regulations will utilize disposition standards from part five, AR 345-210 to supplement these instructions. So far as possible, these standards will be furnished to the units in the form of extracts, prepared in accordance with paragraph 28*b*. Distribution of AR 345-210 to units and activities governed by these regulations will be limited to those cases where preparation of extracts of disposition standards would be uneconomical or impractical.

3, 1 add. c 1,

Section II. UNIT FUNCTIONAL FILES SYSTEM

4. Definition and application. The Army Functional Files System is a numerical scheme for classifying papers. The classification assigned under this system identifies papers for filing, reference, and disposition. A modification of this system, called the Unit Functional Files System, will be used by all units and activities that use these regulations. This procedure is described in paragraph 5. Abbreviations authorized for use with this system are contained in paragraph 13.

5. Principle of system. *a. General.* The Unit Functional Files System uses dual numbers separated by a dash.

(1) The number to the left of the dash consists of the basic functional number. This is derived from a chapter number in part five, AR 345-210. Each of those chapters describes records created in a major functional area (for example, chapter 4 describes legal and information services files). The basic number is assigned to the appendix in these regulations that describes files in the same functional area. This relationship is illustrated in the table in *b* below.

(2) The number to the right of the dash is a number assigned in sequence to files describing specific processes within the major functional area.

b. Basic functional numbers. As indicated above, the basic functional number is the same as the chapter number in part five, AR 345-210, which contains descriptions of files in the appropriate functional area. These chapters, the functional activities they represent, and the basic numbers assigned, for file classification purposes, to appendixes I through IX are listed in the following table. It will be noted that appendix and basic functional numbers have not been assigned for certain functional chapters (e.g., Chapter 8, "Civilian Personnel"). This is because units governed by these regulations normally do not create files in these functional areas. Units that do have special type missions resulting in the creation of such files will follow the procedure outlined in paragraph 3.

AR 345-210 part five chapter	Functions	AR 345-215, appendix number	Basic functional number
1	Office Administrative	I	1
2	Planning, Programming, and Management.	II	2
3	Finance and Fiscal	III	3
4	Legal and Information Services	IV	4
5	Intelligence, Security, and Mapping.	V	5
6	General Personnel Management and Safety.	None	None
7	Military Personnel	VI	7
8	Civilian Personnel	None	None
9	Medical	None	None
10	Education and Training	VII	10
11	Communications Services	VIII	11
12	Transportation Services	None	None
13	Research and Development	None	None
14	Supply	IX	14
15	Facilities	None	None

c. Illustration of file numbers. The construction of a typical file number is explained in the following example. Receipts for classified documents are included in the file described under file number 5-01 in appendix V. The basic functional number 5 is obtained from chapter 5, part five, AR 345-210, which describes comparable intelligence, security, and mapping files. The number following the dash (01) simply means that these files are described in the first item description in appendix V. The entire number (5-01) determines the filing sequence of the papers, and is an abbreviated citation of the authority for the disposition of the papers.

6. Files identified in related regulations. Units that use AR 345-210 to identify files not covered in appendixes I through IX, as provided in paragraph 3, will use the file numbers provided in AR 345-210. For example, a signal unit might create service message files which are identified in chapter 11, part five, AR 345-210, but are not included in appendix VIII of these regulations. The file number for these files would be indicated as 1101-48, the number describing these files in section I, chapter 11, part five, AR 345-210.

7. Unidentified files. *a.* When files are accumulated which are not identified in appendixes I through IX and the unit does not use AR 345-210 or if the files are not identified in AR 345-210, a file number and a file title will be developed. The file number will consist of the basic functional number assigned to the appendix with which the files can be associated functionally (e.g., appendix VI on military personnel files has been assigned a basic functional number of 7), followed by a dash, and the number 100. The number 100 has been selected arbitrarily to represent unidentified files. For example, an unidentified file concerning military personnel matters would be given the number 7-100. The file title developed should identify the records in as few words as possible.

b. The disposition of unidentified files is governed by paragraph 30. Therefore, a reference to that paragraph will be included in parentheses

Section V. FILES EQUIPMENT AND SUPPLIES

22. General. The standard equipment and supplies described in this section will be used in maintaining files, except that—

a. Four-drawer file cabinets may be used as substitutes for five-drawer file cabinets until depletion of the existing supply of four-drawer cabinets.

b. Available nonstandard file guides and file folders may be used as substitutes for standard guides and folders until existing local stocks of nonstandard guides and folders are exhausted.

23. Standard equipment. Files equipment described in TA 20–8, in the TA 130-, 140-, and 145-series, and in applicable TOE's is standard and may be requisitioned within the allowances authorized. When equipment in excess of authorized allowances is required, requisitions will be submitted under procedures prescribed in AR 725–50.

24. Nonstandard equipment. Files equipment other than that authorized in TA 20–8, in the TA 130-, 140-, and 145-series, and in applicable TOE's is nonstandard. When nonstandard equipment is required, it will be requisitioned under procedures prescribed in AR 725–50. Prior to supply action, the records management officer of the installation supporting the unit will review the files operation and submit his recommendation on the equipment requested to the installation supply official.

25. Standard supplies. The following files supplies are standard and will be used in maintaining letter and legal size files, except as otherwise prescribed by Department of the Army directives:

a. Folders.

(1) Folder, file, manila, vertical, plain bottom, scored, 9.5 point, ¾-inch expansion, 9½ by 11¾ inches, square cut.

(2) Folder, file, manila, vertical, plain bottom, scored, 9.5 point, ¾-inch expansion, 9½ by 14¾ inches, square cut. This folder is to be used only when 25 percent or more of the file material is legal size.

b. Guides.

(1) Card, guide, file, pressboard, gray, unprinted, 25-point, self-tab, ⅓-cut, first position, without lower projection, 9½ by 11¾ inches.

(2) Card, guide, file, pressboard, gray, unprinted, 25-point, self-tab, ⅓-cut, first position, without lower projection, 9½ by 14⅞ inches.

c. Labels. Label, folder, paper, gummed, fanfold strip, 500 per box, 3¾ by 1⅛ inches, in the colors buff, pink, blue, green, and white.

d. Fasteners. Fastener, paper, spaced prong type, base only without compressor, 2¾ inches between prongs, steel, 1- or 2-inch capacity, 100 per box.

26. Nonstandard supplies. Supplies, other than those described in paragraph 25 or prescribed in other Department of the Army directives, are nonstandard. Prior to supply action, requisitions for nonstandard supplies will be reviewed by the installation records management office. That official will submit his recommendation on the supplies requested to the installation supply official.

Section VI. DISPOSITION STANDARDS

27. General. Disposition standards for files accumulated by units using these regulations are contained in appendixes I through IX. Inclusion of a standard in these regulations will not be construed to require the maintenance of the file described but governs the filing and disposition of the file when it is maintained.

28. Reference aids for file numbers and standards. *a. List of selected file numbers.* A list of the file numbers used in a unit may be prepared to facilitate filing and reference service and the training of new personnel and to eliminate the need for constant reference to these regulations. This list should contain the file numbers and titles and, if desired, a brief description of each file maintained. This list should be kept current by making changes as new files are accumulated or old files are eliminated.

b. Extracts of specialized types of files. Specialized or noncommon types of files not provided for in these regulations, which are accumulated by a unit having a special mission (e.g., a signal company), will be governed by disposition instructions in AR 345–210. To facilitate the identification and disposition of files in these cases, the disposition standards in AR 345–210 will be extracted on plain paper and maintained with these regulations or with the list described in *a* above.

29. Standard disposition instructions. *a.* The following instructions govern the application of disposition standards contained in these regulations and in AR 345-210 unless special instructions are provided after the description of a particular file:

(1) Files having a retention period of 1 month will be cut off at the end of each month, held 1 month in the current files area, and destroyed.

(2) Files having a retention period of 3 months will be cut off at the end of each quarter, held 3 months in the current files area, and destroyed.

(3) Files having a retention period of 6 months will be cut off semiannually as of 30 June and 31 December of each year, held 6 months in the current files area, and destroyed.

(4) Files having a retention period of 1 year will be cut off at the end of the calendar or fiscal year, as appropriate, held 1 year in the current files area, and destroyed.

(5) Files having retention periods of more than 1 year but not more than 6 years will be cut off at the end of each calendar or fiscal year, as applicable, held 1 year in the current files area, and transferred to the records holding area or appropriate oversea records center where they will be held until expiration of the retention period and then destroyed.

(6) Files which are disposable upon the occurrence of an event (e.g., supersession or obsolescence) or accomplishment of an administrative action, will be withdrawn from the active file upon the occurrence of such event or accomplishment of administrative action and destroyed.

(7) Files which are disposable after a specified retention period following the occurrence of an event or the accomplishment of an administrative action (e.g., audit, final payment, or completion of a project) will be withdrawn from the active file upon occurrence of the event or accomplishment of the administrative action, and placed in an inactive file. The inactive file will be cut off and disposition effected in the same manner as for other files with comparable retention periods.

(8) Permanent files or files having retention periods of more than 6 years (except files of units of the Army Reserve dated after 31 December 1960) will be cut off at the end of each calendar or fiscal year, as applicable, held 1 year in the current files area, then transferred to the records holding area or appropriate oversea records center, where they will be held 2 additional years, and retired to the ~~U.S. Army Records Center.~~ NPRC Permanent files or files having retention periods of more than 6 years created by units of the Army Reserve after 31 December 1960 will be cut off every 5 years, at the end of calendar years divisible by 5, held 1 year in the current files area, and retired in 5-year blocks to the U.S. Army Records Center. The first 5-year cutoff will be effected as of 31 December 1965 and new files will be established as of 1 January 1966. Any new files started within the 5-year interval between cutoff dates, as a result of the activation of a unit or for any other reason, will be cut off initially at the end of the next calendar year divisible by 5, held 1 additional year, and retired.

(9) Files which are to be retired after a specified retention period following the occurrence of an event or the accomplishment of an administrative action will be withdrawn from the active file upon occurrence of the event or accomplishment of the administrative action and placed in an inactive file. The inactive file will be cut off at the end of the calendar or fiscal year, as applicable, and disposition effected as provided in (8) above for files having a retention period of more than 6 years.

b. Offpost units or other units in the continental United States not serviced by a records holding area may retain files prescribed for transfer to

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see c.1

APPENDIX IX

SUPPLY FILES

File No.	Description	Disposition
14-01	*Supply administrative files.* Documents accumulated in connection with the general administration of accounting for supplies but exclusive of specific operational files described in this appendix.	2 years.
14-02	*Property books and supporting transaction files.* Documents accumulated by units as a record of the receipt, issue, and turn-in of property. They include property books, property issue and turn-in slips, reports of survey, statements of charges, and related papers. Upon receipt of notice that a unit or activity is to be discontinued, the installation commander will cause the pertinent property books to be examined by a qualified representative for the purpose of determining that the property books have been reduced to a zero balance and for verification of the fact that all property has been turned in to the appropriate supply officer or otherwise satisfactorily accounted for in accordance with applicable instructions. If the officer conducting the examination is satisfied that the required action has been taken and that formal audit is unnecessary, the commander referred to above will direct immediate destruction of the records upon completion of examination or discontinuance of the unit or activity.	Property books: 2 years after page is filled and initial accounting entry is carried forward to a new page or 2 years after property balance becomes zero and there is to be no further activity on the item. Special authorizations to draw equipment, such as those in excess of authorized allowances: On supersession or obsolescence of authorization or on discontinuance of activity. Remaining files: 2 years.
14-03	*Unit property records inspection report files.* Reports of inspection of unit property records and related materials reflecting results of semiannual inspection.	Offices conducting inspection: 3 years. Offices inspected: 1 year.
14-04	*Unit property hand receipt files.* Receipts reflecting acceptance of responsibility for items of property listed thereon, which property is loaned or issued for use and is to be returned, or documents produced showing other proper disposition.	On turn in or other complete accounting of the property issued.
14-05	*Personal property accounting files.* Inventory of personal property, similar forms, and related documents reflecting items of personal property of individuals absent without leave or absent sick in medical facilities.	~~On return of the property to the individual~~ 2 yrs - c 4
14-06	*Transaction files.* Files maintained by organization and activity supply officers reflecting vouchered transactions with units or subactivities, and all transactions with higher supply echelons.	2 years.
14-07	*Unit supply report files.* Reports prepared by unit supply officers for submission to higher headquarters relating to the maintenance and receipt of supply items, such as equipment status reports and reports on supply levels, critically short items, and other matters which affect the maintenance and receipt of supply items, including related papers to such reports.	1 year. see c 4
14-08	*Unit supply inspection files.* Inspection reports of units outfitted prior to movement overseas, including showdown inspection reports, final inspection reports, and related papers on inspection.	2 years.
14-09	*Unit packing certificate files.* Documents which certify that proper crating and packing of organizational equipment has been accomplished prior to the movement of a unit to a new station.	6 months.
14-10	*ROTC military property custodian files.* Vouchers and requisitions, stock record cards, voucher registers, supply reports, and related correspondence. Stock record cards for active items will be placed in an inactive file only after the cards are filled or ruled off.	2 years.
14-11	*ROTC military property custodian designation files.* Retained copies of letters designating military property custodians and assistants, revocation of appointments, and related matters.	2 years after termination or revocation of appointment.

File No.	Description	Disposition
14-12	*ROTC commutation of uniform files.* Documents accumulated by military property custodians from commutation of uniforms.	Upon departure of student from institution, file in ROTC student personnel file for appropriate disposition (see file number 10-08).
14-13	*Individual clothing and equipment record files.* Documents reflecting the issue and turn in of clothing and equipment to members of a unit.	As indicated in AR 700-8400-1 and AR 640-10.
14-14	*Publications requisition files.* Retained copies of requisitions for publications and nonaccountable blank forms.	3 months.
14-15	*Initial distribution requisition files.* Retained copy of DA Form 12-series accumulated from the process of requesting in advance, the desired automatic distribution of specific numbers of designated types of publications and blank forms. Only the current copy of DA Form 12-series will be maintained.	On discontinuance. However, superseded forms will be destroyed when replaced by current forms and forms indicating changes will be destroyed on completion of posting to the current series.
14-16	*Unit and organizational laundry and drycleaning files.* Laundry and drycleaning weekly collection and delivery sheets, organization laundry lists, laundry and drycleaning adjustment vouchers, and related documents and papers maintained by a unit or organization in the process of controlling the receipt and delivery of laundry and drycleaning and in collecting payment therefor.	1 year.
14-17	*Garrison ration account files.* Documents relating to garrison rationing, including daily stock cards, monthly recapitulations, and adjustment papers, but exclusive of such documents when used as an entry or as a voucher to a unit fund.	2 years.
	FIELD RATION ACCOUNT FILES OF MESSES. The files described under file numbers 14-18 through 14-21 are accumulated by field messes in connection with ordering, accounting for, and serving field rations.	
14-18	*Cash receipt files.* Documents used as receipts for cash and documents reflecting collections. Included are schedules of collections, turn-in slips, ration requests, and similar documents.	1 year.
14-19	*Cooks worksheets.* Documents constituting cooks worksheets.	1 month or after appropriate review by the unit commander or officer in charge of mess, whichever occurs first.
14-20	*Nonreceipt ration request files.* Ration requests not serving as receipts for cash and cash collection sheets.	On preparation of succeeding request.
14-21	*Field ration issue and delivery files.* Documents relating to issue, delivery, and preparation of rations by messes. Included are field ration issue slips, turn-in slips not used as receipts for cash, delivery tickets, copies of master menus and/or installation menus, and pertinent minutes of the installation menu board.	3 month.
	FIELD RATION ACCOUNT FILES OF ACTIVITIES OTHER THAN MESSES AND COMMISSARIES. The files described under file numbers 14-22, 14-23, and 14-24 accumulate in connection with the ordering, issuing, accounting for, and serving field rations. They are accumulated by activities other than messes and commissaries.	
14-22	*Field ration issue and delivery files.* Ration requests (original from messes and duplicate of consolidated request submitted to commissaries), schedules of collections and/or cash collections sheets, field ration issue slips, turn-in slips, extracts of overissues, unannounced head count spot checks, and similar documents.	1 year.
14-23	*Cash collection sheet register files.* Individual pages of cash collection sheet registers.	After entries thereon have been completed.
14-24	*Menu files.* Copies of master menus and/or installation menus and pertinent minutes of meetings of the installation menu board.	1 month.
14-25	*Food service program files.* Correspondence and other documents relating to the general administration of the food service program, including reports of progress, inspection reports, reports relating to food preparation and preservation, and related papers.	2 years.

File No.	Description	Disposition
14-26	*Unit training equipment issue and turn-in files.* Documents relating to the request to station supply agencies for training equipment, notifications of action taken on the request, and the return of training equipment to station supply agencies, including issue slips, turn-in slips, and correspondence concerning the issue and turn in of film.	Upon turn in of equipment to which the pertain.
14-27	*Unit training film issue and turn-in files.* Copies of requests of film libraries for training film and filmstrips, notifications of action on requests, and documents relating to the return of training film and filmstrips to film libraries, including issue and turn-in slips.	On turn in of film.
14-28	*Gasoline and lubricants issue files.* Documents relating to the issue of gasoline and lubricants, including issue slips and abstracts of fuel and lubricant issued.	1 year.
	EQUIPMENT LOG BOOK HISTORICAL FILES. The files described under file numbers 14-29 through 14-35 constitute a complete historical summary for individual items of equipment. They provide factual and up-to-date information pertaining to the equipment's receipt, operation, maintenance, modification, transfer, and disposal. Equipment logs may consist of a single form or of numerous forms as prescribed by TM 38-750 and related directives. These files will accompany the equipment to which they pertain in accordance with TM 38-750 and related directives. Individual maintenance forms maintained in the equipment log book that have short term value will be withdrawn and disposed of in accordance with instructions under file numbers 14-36 through 14-45 below. The term, "dropped from accountability" as used in disposition instructions for these files means when dropped from accountability due to the equipment's loss through excess, disposal, salvage, or combat.	
14-29	*MAP equipment log book and historical files.* These files relate to equipment furnished to foreign governments under Military Assistance Programs. The new organizational equipment file, prepared at the depot prior to shipment to the foreign country, will accompany the equipment.	2 years after shipment of related equipment.
14-30	*General purpose log book historical files.* These general purpose files are maintained for the numerous items of equipment not requiring special logs or forms.	When the related equipment is dropped from accountability, transfer to the National Maintenance Point having responsibility for the equipment concerned (see app. IV, TM 38-750, for addresses).
14-31	*Artillery log book historical files.* These files provide a record of condition and serviceability during the life of the weapon and serve as a source of technical data for improvement of existing weapons, and design and development of new weapons. Separate files are maintained for major components of complex equipment.	When item of equipment or major component thereof is dropped from accountability, transfer to the CG, U.S. Army Tank-Automotive Center, 1501 Beard Street, Detroit, Mich.
14-32	*Administrative motor vehicle log book historical files.* These files relate to administrative use vehicles.	When related vehicle is dropped from accountability, transfer to the U.S. Army Transportation Administrative Transport Management Agency, Fort Geo. G. Meade, Md.
14-33	*Missile system log book historical files.* These files relate to missile systems. Separate logs for major assemblies and/or components thereof may also be established.	When related equipment is dropped from accountability, transfer to the CG, U.S. Army Missile Command, Redstone Arsenal Huntsville, Ala.
14-34	*Aircraft log book historical files.* These files relate to army aircraft.	When dropped from accountability, transfer to the CG, U.S. Army Transportation, Materiel Command, ATTN: TCMAC-F, 12th and Spruce Streets, St. Louis, Mo.

File No.	Description	Disposition
14-35	*Parachute log book and historical files.* These files relate to Army parachutes.	When ~~dropped~~ from accountability, destroy immediately. S/S C 4
	MAINTENANCE AND INSPECTION FILES. The files described under file numbers 14-36 through 14-45 accumulate in the process of accomplishing required preventive maintenance and inspection and repair of equipment. Procedures require that some documents be filed in the related equipment log book and historical file, while others are filed in organization activity files.	
14-36	*Equipment inspection and maintenance work sheet files.* These files reflect the performance of preventive maintenance inspections, services, diagnostic checkouts, and command materiel readiness inspections.	On posting of related equipment log book, or on entering deficiencies on a new form, as applicable.
14-37	*Preventive maintenance roster and schedule files.* Rosters and schedules used for scheduling periodic preventive maintenance services, load tests, and calibration of assigned equipment.	On completion of a new schedule.
14-38	*Maintenance request files.* Forms used to request maintenance services and to submit recommendations for improving equipment or procedures.	On transfer of data to the equipment log book, except that requests used as equipment improvement recommendations will be destroyed after 3 months.
14-39	*Maintenance request register files.* Registers used to record and control maintenance work.	1 year.
14-40	*Exchange tag files.* Exchange tags used as receipts for replacement of parts or components.	On return of related equipment.
14-41	*Parts slip and work required files.* Forms used to record maintenance services or repairs accomplished and as an authorization document to obtain and account for services and repair parts used.	On completion of required posting of data to the equipment log book.
14-42	*Equipment daily log files.* Daily logs are used to show the daily status of equipment and provide a record of miles or hours operated, fuel and oil consumed, and number of days operational.	On completion of transferring data to the equipment monthly log.
14-43	*Lubrication record files.* Forms providing a record of both scheduled and unscheduled lubrication services performed on the equipment.	1 year after final entry on the form.
14-44	*Consolidated equipment maintenance log files.* This form is used to provide a complete maintenance history of an item of equipment for which there is no log book but which requires a record of maintenance.	On final disposition of related equipment.
14-45	*Daily equipment cost record files.* Forms constituting daily costs chargeable to equipment.	On transfer of the information to an accumulative cost form.
14-46	*Organizational control record files.* These records reflect the daily dispatch of equipment.	1 month.
14-47	*Welfare fund supply files.* Files accumulated from welfare enterprises relating to the utilization of funds derived from revenue producing activities or from voluntary contributions, and used to defray the expense of providing athletic, recreational, and welfare services and facilities for military and civilian personnel. They include documents relating to the administration of activies financed by welfare funds. Included are property records, vendor's vouchers, contracts and purchase orders, and similar papers relating to welfare fund activities. Prior to disposal, a careful search of the files will be made for cash, United States Treasury checks, or Government securities, or safekeeping receipts therefor. When any such items are found in the records of a fund, the records will not be destroyed, but the Custodian, Army Central Welfare Fund, Office of The Adjutant General, ATTN: AGMF, Washington 25, D.C., will be notified.	3 years, except that individual contracts or purchase order files involving transactions for more than $2,500 will be destroyed after 6 years.

ORIGINAL (Red)

File No.	Description	Disposition
14-48	*Supply reference papers files.* These papers relate to supply matters and consist of (1) copies of documents which duplicate the record copies filed elsewhere in the same headquarters, activity, or unit; (2) documents which require no action; (3) rough drafts, notes, feeder reports, and similar working papers accumulated in preparation of a communication, study, or other document but exclusive of formal recommendations, coordination actions, and other papers which contributed to or resulted from preparation of the document; and (4) cards, listings, indexes, and other papers used for controlling work.	Cut off every 3 months, 6 months, annually or on completion of project. Destroy as blocks 3 months, 6 months, or 1 year after cutoff, or on completion of project. Use minimum of above periods that will meet reference needs.